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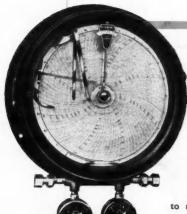
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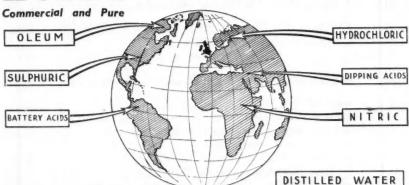
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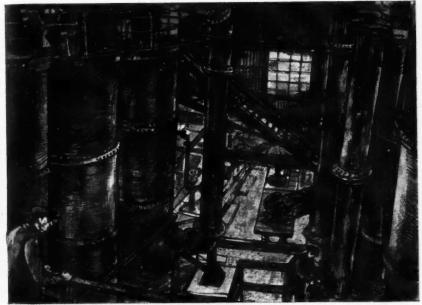
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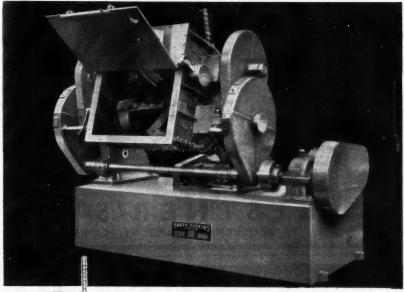
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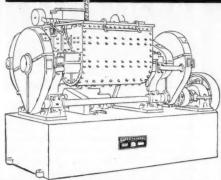
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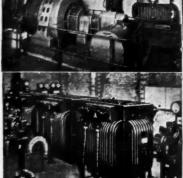
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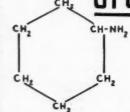
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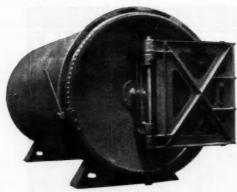
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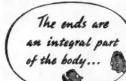
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2 October 1948

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The Narrowing Focus

I T is an old complaint, which has received attention before and has gained fresh currency now, that the chemist tends to become too much the man of one subject and too little the man of affairs. That is the traditional view, which, according to chemists, has been assiduously promulgated by those who are not chemists. There is, however, a good deal of truth in it. To some extent it is due to the incarceration of the chemist in his laboratory; it is difficult to be a man of affairs if one is not allowed to mix with one's Circumstances and policies tend to keep the specialist chemist year after year doing admirable work in a subordinate position. Specialisation, it must be admitted, is often the result of conscious choice of environment, abetted by the deliberate policy of the employer, or it may be the consequence of absorption in the work in hand. This modern parallel of the cloistered life is certainly not without great compensations and the widening of the boundaries of science during the present century seems to demand the single-minded approach. There may, of course, be a difference of outlook on this subject according as a man is engaged on academic or industrial work.

There are few people better fitted to discuss this subject than Prof. John Read, author of that wide-ranging commentary " Humour and Humanism in Chemistry, and it is well that he has done so in his

address to the Chemistry Section of the British Association. Prof. Read does not consider the effects of specialisation on a man's industrial career, but on his outlook on life. The one, however, may be taken to embrace the other, for a man's outlook on life must profoundly affect the way he moulds his career.

Specialisation is a disease of modern times. Prof. Read can quote many examples of men of science, who up till quite recent times, could exchange Chairs with their colleagues in other branches of science without discredit or the fear of it. Boerhaave, who was described as "the most distinguished teacher of his times and a man of immense and varied learning in languages, philosophy, theology, mathematics, botany, chemistry, anatomy and medicine," was no exception. Even in the 1840's at Oxford, Charles Daubney held simultaneously the three Chairs of Chemistry, Botany and Rural Economy. Those were the days when a man could take all science for his field. The chemist was an all-round practitioner of his art, self-reliant, indeed a research unit in himself, if he engaged in that fascinating pursuit. He designed his own apparatus; often he made most of it; he conducted all his own experiments. The idea of teamwork in the modern sense was unknown. Those days are not far past; that was the common procedure 25 years ago. To-day, the vision of the student and the research

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worker has narrowed, and so has his range of accomplishment in the laboratory.

The outstanding characteristic of the pioneers, says Prof. Read, was rich multiformity and individuality, flowing from the diverse nature of their education and training, often obtained only with great difficulty. Many scientists who have specialised in one science are quoted in Prof. Read's paper as declaring the evil effect of specialisation on their own life and habits of thought. This habit has led to the segregation of chemists, to the detriment of chemists and of science at large. This lamentable tendency to withdraw from the world of affairs is, of course, not confined to chemists. Every profession, engineering, accountancy, company secretaryship, and so forth, tends to form its own private world. The difference between them and the chemist is that they are brought by the nature of their work more into contact with practical affairs and thus escape the strictures levelled against those who spend their lives in purely scientific pursuits.

"It will not be seriously contested," says Prof. Read, "that the intense specialisation which is an inevitable consequence of the expansion of science is bound up with serious handicaps." The problem is well understood. What is much more difficult is to determine how to solve

it. Science does not stand still. Knowledge which a century ago grew slowly, now increases in geometrical progression. The pace is more likely to quicken than to slacken. Specialisation will continue to be inevitable and may become narrower than it is to-day. The problem seems to be not of avoiding specialisation but rather of overcoming or reducing its ill-effects on the individuals. Prof. Read agrees with this view, it seems, and his answer is briefly that whatever is done must be done during the educational stage: mainly atschool, partly at the university. A lively interest in literature, art, history, music and the drama should be fostered; once fostered, it must not be allowed to die. " If I had my life to live again," wrote Charles Darwin, " I would have made it a rule to read some poetry and listen to some music at least once every week; perhaps the parts of my brain now atrophied would thus have been kept active through use."

There was much more in Prof. Read's paper, but mainly in amplification of this theme. Two consequences follow. The first is that the practice of passing at school a difficult and extensive university entrance examination (or scholarship examination, which is much worse) in nar-

(Continued on page 442)

NOTES AND COMMENTS

Chemical Export Totals

THE August results of chemical trading overseas, having regard for the comparative shortness of the month-25 working days, compared with July's 27again appear to show that this branch of the national economy is more firmly entrenched than many others. exports of manufactured goods as a whole vielded only £115.2 million (£12.2 million less than in July) towards the grand total for the month of £130.5 million, the return of £4,147,669 from foreign sales of chemicals, excluding drugs and dyestuffs, was only some £73,000 less, and was more than £1 million higher than the return in August a year ago. This relatively steady basis of trading has prevailed throughout the chemical trading field, the totals for drugs and medicines (£1,236,866) and for dyes and dyestuffs (£530,411) representing approximately equivalent reductions from the higher totals recorded in July. That stability is agreeably manifest in most of the individual large-scale chemical exports; the comparatively few substantial reductions in volume are fully compensated by increases in other categories. Exports of ammonium sulphate (17,109 tons) and disinfectants, insecticides, etc. (40,749 cwt.) were each only about half as large as in July, although both compare well with the August, 1947, figures. There were, on the other hand, such large increases as those recorded for calcium carbide, 13,292 cwt. (1373 in July), salt, 19,310 tous (13,987), caustic soda, 227,549 cwt. (164,562) and sodium sulphate, 85,769 ewt. (51,512).

Links with Scandinavia

WITH the ending to-morrow (Sunday) of the British Exhibition in Copenhagen, which for a fortnight has translated for Danish audiences the hard facts of Britain's industrial capacity into tangible and attractive form, there is a natural impulse to look for concrete results in terms of trading contracts. That is a short-sighted view and, as the article by a special correspondent in this issue indicates, it is not likely to be gratified by a trade boom, or anything like it. Much more important is the evidence that many of this country's most useful chemical products for industry

and the excellent plant and laboratory equipment evolved here in recent years are now well established in Scandinavian regard, for the interest in the exhibition was by no means confined to Denmark itself. Such propaganda could not have come at a more opportune moment; in Sweden foreign trade is increasingly being directed into new channels through the scarcity of hard currencies (records the Anglo-Swedish Review). "One of the most striking features of Swedish trade figures for the first six months of the year," says this well informed review, " is the increase which has taken place in imports from the sterling area. Imports from Great Britain have risen by more than 80 per cent." That result is not confined to Sweden, as the current overseas trading figures of the U.K. bear witness. In the field of chemicals, drugs and dyestuffs Norway, Sweden and Denmark each gave the most reliable evidence last month of their readiness for closer integration with British industry. taking delivery of chemical goods worth some £573,000, compared with £316,000 in the same month a year ago.

Scientific Research Films

CONFERENCE to be held in London A shortly is stated to have the laudable aim of fostering international co-operation in scientific matters by means of the interchange between the countries of the world of scientific research films. This is a oneday conference on "The Film in Scientific Research," which is to be held at the Royal Institution, London, on October 12, under the aegis of the Scientific Film Association, and which will constitute a kind of winding-up session to the second International Scientific Film Congress which is being held from October 4 to 11 inclusive. Delegates from more than 20 overseas countries are expected to attend the congress, at which films produced by some 15 nations are to be shown. official of the International Scientific Film Association informed The Chemical Age that a suggested way of solving the language problem in connection with the international exchange of these scientific films -many of which have a sound track of a spoken commentary—is to circulate a duplicate of the photographic portion accom-

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panied by a typewritten or printed script of the commentary in the language of the country in which the film was made. This latter would be translated into the tongue of the receiving country and form the basis of a new sound track, which would not need to be synchronised. It is also suggested that an international, multi-lingual catalogue of these films shall be made. The whole idea appears to have rich potentialities, chiefly as a practical means of fostering international co-operation in a scientific sense, and later perhaps as an avenue by which a much wider field for collaboration and understanding could be reached.

Marshall Aid for Science

THE vast and unparalleled economic experiment conveniently labelled as Marshall Aid is being given credit in advance as the lubricant which will infuse new life into moribund trade channels: comparatively little, however, has been said of the benefits which may also accrue to research in the recipient countries, and especially in the United Kingdom. \$500 million, the current allocation to the U.K., is sufficiently large a sum to permit

margins for the acquisition of scientific equipment in nuclear physics and some other fields in which American science, abundantly financed, has admittedly outstripped us in the methods of application. That view is borne out by Dr. Karl Lark-Horovitz, general secretary of the American Association for the Advancement of Science, who has been recommending that his country should make available here and elsewhere in Europe some of these specialised instruments, including surplus micro-wave equipment, widely needed in academic research in structure of mole cules, atoms and nuclei. Dr. Lark Horovitz's appeal for more tools for the scientists of Europe was stimulated by what he saw during a recent two-months visit to European laboratories. turned as an enthusiastic supporter of what he saw here, in Denmark and in Holland. "Research being carried on in Great Britain is one of the most exciting of all scientific centres today," he has told Economic Co-operation authorities in the U.S.A. "In all English laboratories there is not only a great deal of research work going on but it is work of the highest quality."

THE NARROWING FOCUS

(Continued from page 440)

rowly specialised subjects must cease, in order that the formative years shall be devoted to real education in the wider sense. Since, however, science requires ever more votaries, more time must be spent on education than in the past. Prof. Read says: "We shall probably agree that it would be well for the competent student who wishes ultimately to specialise fully in chemistry to devote four years to a course of study leading to an honours degree in chemistry, followed by two or three years of research work in a special branch of this subject." That means in effect that every chemist who aspires to mastery of his subject, and to a full life, should leave school at about the age of 18, take his degree (if he passes first time) at 23, and enter industry or the laboratory at 25 or 26. Can we afford this length of time, which will be extended by a year or two if military service is retained?

The answer may well be that we cannot

afford to do otherwise. We have to train a race of scientific men who can hold their own with the world. We make haste at our peril. To contract the years of training would be to invite the reproof which Prof. Read quotes as coming from Berzelius in quite another connection: "Das war geschwind aber schlect" (That was fast but faulty).

That, it is evident, is a major problem that must be faced while education is in the melting pot. Those who can benefit from such a system of training, must be hand picked, trained in such a way as to avoid specialist one-track minds, and then enabled to become specialists in their subjects, without the danger of minds becoming partly atrophied by over-absorption. Ten years hence scientific knowledge may have leapt so far ahead that even more specialist training will be needed. If that is indeed the prospect, it is all the more necessary that the specialist shall possess a wide background of culture if he is to preserve his sanity.

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GOOD REPORTS FROM COPENHAGEN

Marked Improvement in Goodwill and Trade Prospects

THERE has been large-scale support by the British chemical industry for the British Exhibition in Copenhagen which closes after a memorable fortnight's demonstration of Anglo-Danish goodwill.

The exhibition has conspicuously increased the already pronounced goodwill in Denmark for Britain and for the products of British manufacturers, and while no immediate return in a substantial expansion of orders can be expected, the long-term prospect is that in this tangible way the exhibition will in due course yield a handsome dividend.

It is freely recognised, not least by the Danes themselves, that the market is a limited one and at the present time severely restricted by the import licensing regulations. Completion of the new Anglo-Danish trade agreement will, it is hoped, in the coming year permit of greater imports from

this country of manufactured articles, and the good harvest will enable Denmark to increase her shipments of foodstuffs to Britain which will in turn free more sterling for Danish purchases from British industry.

The significance of the Danish market for the products of the British chemical industry lies in the fact that two-thirds of Danish imports are paid for by exports of agricultural produce in the rearing of which a third of the entire population is engaged. Another important factor is the elimination of Germany as a source of supply of Danish requirements in the chemical field.

Prominent among the exhibitors, with three separate stands in the five centres in which the exhibition was staged, were Imperial Chemical Industries, Ltd., which featured its selective weed-killer Methoxone, and the insecticide Gammexane. Samples were shown also of the Alcian blue dye



The chemicals section at Copenhagen, in which more than one firm modernised and improved on their BIF displays. The I.C.I. arrangement in the foreground, effectively representing the derivation of dyes and agricultural chemicals, was a distinctive example

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which enables textile printers to secure a non-fading turquoise blue colour.

The exhibition has shown to many of the Danish people for the first time since the liberation the quality of British post-war production and has demonstrated the merits in sound design and construction of British equipment. Danish business men have been noticeably impressed by the effort made by British firms to present their manufactures in a colourful and effective setting, which the Danes themselves have earned credit for providing.

The Daues have been a little fearful that the actual volume of firm business which will repal British exhibitors for their enterprise in participating may prove a disappointment. It is not possible, or reasonable, to attempt to measure the value of the exhibition to Britain in terms of orders placed on the spot or of Danish immediate

capacity to buy,

Nor can the results be measured in terms of Danish trade alone. Copenhagen is commercially the strategic centre of Scandinavia and the exhibition attracted indusdinavia, importers and farmers in considerable numbers from Norway and Sweden and to a lesser extent visitors from Holland, Belgium and France.

It is generally thought that British shipments of raw materials, chiefly coal and steel, under the new commercial treaty will pay for the bulk of Danish exports to Britain and that a considerable balance should remain for British chemical and other manufactured goods. Attention is now focused therefore upon the apportionment of this margin; but much will necessarily depend on the development of Danish exports to Great Britain and the further reduction of the adverse sterling balance of Denmark.

Importers are not unaware that until the basic needs of the country are satisfied a more liberal attitude by the Danish import licensing bureau to applications for licences for manufactured goods cannot be expected. There will be further negotiations later in the autumn relating to the allotment of licences to particular classes of goods, but while Denmark remains a debtor country there will be a natural reluctance to import commodities which local industries can also supply.

Tonnage Exports of British Anti-Leprosy Drug

ONSIDERABLE stimulus is reported to Ahave been given to the manufacture and export of Sulphetrone (tetrasodium 4: 4'-bis-(γ - phenylpropylamino) - diphenylsulphone α: γ: α': γ'-tetrasulphonate), the British drug which is now being used increasingly in the fight against leprosy, as a result of favourable reports. Sulphetrone has been developed in the laboratories of the Wellcome Foundation, Ltd., London. Its chemical preparation has been described by Henry and Gray (1938) and by Buttle et al (1938). It is thought to have the following chemical structure:-

the molecular weight being 892.5.

Sulphetrone is prepared in the form of a white amorphous powder which is very soluble in cold water but insoluble in alcohol and other organic solvents. The stronger aqueous solutions (60 per cent) are stable when neutral or slightly alkaline and can be autoclaved. Weaker solutions are not so stable and the drug is not at present issued in solution form.

In April of this year, at the International Congress on Leprosy, held at Havana, Cuba, all the leading experts on the disease discussed the best forms of treatment, and among the sulphones indicated for use the one of their choice was Sulphetrone.

In an interview at the Wellcome Laboratories, a representative of THE CHEMICAL Age was informed that exports of Sulphetrone to the leprosaria of the world were expected to increase steadily. It was already possible to speak of them in terms of tons, and many tons would now almost certainly be exported annually. Practically the whole of the output would be sent to countries in the tropical belt.

Actual quantities were very difficult to timate. The estimation of the number of estimate. lepers in the world varies between two and five millions, the reason for the gap being that the disease occurs chiefly in countries where the collection of statistics of any sort is non-existent. Organised treatment of the disease of leprosy is quite often left to be carried out by voluntary religious bodies, by whom the question of available funds has to be taken into account. Dosage also varies. Between one and two kg. a year has been found to be the average quantity needed for the treatment of a patient.

Other problems affecting the quantities of Sulphetrone which can at present be exported are the registration of the drug in various countries, and currency regulations. The drug is already being exported to America as well as to the sterling areas.

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Value of Exports Maintained

Chemicals Yield £1.1 Million More Than Last Year's Total

A LTHOUGH not reaching quite such a high total as in July, the value of chemicals, excluding drugs and dyestuffs, exported from Great Britain in August was £4,147,669 as compared with £3,073,601 for the same month last year. The total compares well with the £4,520,840 total recorded m July, in which were two more working days.

СНЕМІС	CAL	EXPO	RTS	IN AUGI	UST.
				Aug.,	Aug.,
				1948	1947
				Cwt.	Cwt.
Formic acid	***	8.656		2,454	3,877
				Lb.	Lb.
Salicylic acid and	d sal	icylates		248,815	90,104
				Cwt.	
Tartaric acid					Cwt.
Value of all other			***	771	
value of all other	POLI	s of acte		£65,548	£57,359
				Tons	Tons
Aluminium oxide	e 9	***		234	510
Sulphate of alun	ina		***		
All other sorts o	falu	minium	com-	*10.40	
pounds					974
Ammonium sulp	hate	***			
Ammonium sulp Ammonium nitra	to	***	444		
All other sorts of	CO BREET	rom from	8.66	14,096	2,470
pounds	***	***	1.61	1,912	
DI				Cwt.	Cwt.
Bleaching powde	r	2.00	6.6.4		35,558
All other bleachi	ng m	aterials	355	7,856	5,085
Calcium carbide	***				1,294
				Gal.	Gal.
Benzol		***			
Cresylic acid		***		212,567	257,988
Tar oil, creosote	lio s	anthro	100000	212,001	149,136
oil, etc	Osi,	COLLECTION CO.	cene	0.451.050	0.401.444
Value of all other	conte	. af dan .		2,471,270	3,194,111
value of all other	SOLFI	oi tar c	ш	£39,753	£31,185
				Cwt.	Cwt.
Naphthalene				7,612	
Collodion cotton		***		1,213	4.013
				Tons	Tons
Copper sulphate				887	809
**				Cwt.	Cwt.
Disinfectants, ins	ectic	ides et	re.		
	COUL	ruco, cu	Un ver	40,749	49,558
Fertilisers				Tons	
retuiners	***	***	***	1,567	
Clypowing				Cwt.	Cwt.
Glycerine Nickel salts	***	***	224	2,126	
Nickel saits	***	***	***	2,456	4,279
Lead acetate, lit	harg	e, red	lead,		
etc.		***		9,751	5,677
				Tons	Tons
Magnesium comp	ound	8		756	923
				Gal.	Gal.
Methyl alcohol			***	7,463	
				Cwt.	Cwt.
Potassium compo	und				CWL.
composition compo	runus		***	7,115	
Salt				Tons	Tons
Sait		8.8 4	7.00	19,310	16,092
				Cwt.	Cwt.
Sodium carbonate	e, etc			452,803	226,344
Caustic soda		***	***	227,549	100,551
Synthetic sodium	nitr	ate	***	50	
Sodium silicate			***	11,608	6,348
Sodium silicate Sodium sulphate				85,769	
All other sodium	com	nounde			58,135
saire availlin	· Critil	ARRINIS	***	96,020	
Cream of tartar				Cwt.	Cwt.
Tip owide			***	350	
Tin oxide	***	4.4.5		888	
721				Tons	Tons
Zinc oxide				1,100	1,136
Total value of	chem	ical ma	nnu-		-,
factures, exclu	ding	drugs	and		
dyestuffs		1		£4 147 660	69 079 601

... £4,147,669 £3,073,601

Exports generally, as shown in the latest issue of the *Trade and Navigation Accounts* of the *U.K.* (HMSO, 4s. 6d.), were satisfactory. Quantities of sulphate of alumina and all other sorts of aluminium compounds were double the figures for July, while salt showed a considerable increase.

The value of coal exports compared with August, 1947, was more than doubled.

Quinine i			lts		Oz. 159,629 Lb.	Oz. 113,141 Lb.
Acetyl-sa	dicylic	acid		***	111,760 100	119,258 100
Insulin	***	***	***		Inter- national units 424,038	Inter- national units 574,572
Penicillin			***	- ***	Mega units 424,457	Mega units 168,536
Total va and pr Total valu	eparati	drugs, ons es and o			£1 996 966	£1,208,743 £505,634
Plastic m	aterials	, other	than e	asein	Cwt.	Cwt.
Value	lluloid,	etc.	***	66.K	30,726 £386,431	20,465 £230,955
Chemical Value	glassw	are	***		Cwt. 1,191 £40,759	Cwt. 1,309 £40,748
Furnace Value	plant	***	***	***		Tons 369 £66,537
Coal Value	***	***			Tons 975,629 £3,587,207	Tons 78,822 £161,773

CHEMICAL IMPORTS

					Aug., 1948 Cwt.	Aug., 1947		
Acetic aci		***		***	23,332	Cwt. 9,974		
Boric acid	***		***		2,200	4,000		
Tartaric a		***		555	reman.	900		
All other a	acids	***	***	444	4,569	2,815		
	***	244	255	664	3,600	13,500		
Bromine a			200	4.61	-	1,468		
Calcium e				64.6	24,350	42,020		
Coal tar pr	oduct	ts, exclu	ding t	enzol	-1,000	12,020		
and cres	ylie a	icid	***	***	651	1,187		
Cobalt oxi	des	***			Tons 136	Tons 378		
					Tons	Tons		
Ammonius	m phe	sphate	215	***		3,062		
Arsenic	444			***	447			
Fertilisers		ilisers	8	***			3,022	1,189
				511	3,022	1,925		
Iodine					Lb.	Lb.		
100mic	1.11		100	5.5.6	132,100	59,569		
Potassium	oblos	dda.			Cwt.	Cwt.		
			***	***	813,530	775,532		
Potassium	suipi	iate	***	0.00	10,340	29,210		
Other pota	issiun	1 compo	unds	***	4,024	5,893		
Sodium ni		***	***		39,881	19,940		
Other sodi	um ec	ompound	ls	***	3,865	13,531		
Carbon bla	ick.	***	***	***	68,927	109,308		

Total value of chemicals, drugs, dyes and colours ... £2,698,815 £2,591,018

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DUST PROBLEMS IN INDUSTRY

Society of Chemical Industry's Conference at Leeds

SPONSORED by the Society of Chemical Industry, a conference on "Dust in Industry" was held at Leeds University on September 28, 29 and 30. Among the great variety of technical contributions by

experts were the following:—
In the opening paper, Mr. G. Nonhebel, of Imperial Chemical Industries, Ltd., went to the root of the matter concerning industrial disease as it arises from the working of plant. The mathematics of physical chemistry play a more fundamental part than do many of the mechanical gadgets that are used, important though these are to help out the main safety principles. And it is upon these principles that more research must be carried out in the universities and in industry.

More Rapid Analyses

Mr. Nonhebel pleaded for more rapid methods of analysis of dust particles and a closer examination of the points of the plant where they arise. He was particularly interested in the aerated powders that have been developed (as catalysts) by the petroleum by-product industry during the war. Some idea of the importance of the health bazards concerned might be gathered from the fact that in America mammoth plants have been erected in which such dusts are circulated at a rate of over 30 tons per minute.

"Gas Explosions and Dust Explosions—A Comparison," by Dr. A. G. White and E. Jones.

Based on the results of an investigation of the dust explosion hazard in the preparation of pulverised fuels for use in explosives, a comparison is drawn between the inflammable properties of dust clouds and those of the better known gaseous explosive media. Useful generalisations like Le Chatchier's Rule and the Law of Flame Speeds, which summarise the "normal" behaviour of inflammable gases, are shown to be consistent with the view that flame propagation in gaseous media is a thermal process, the rate-determining factor being probably the temperature reached in the

The calorific value of the gas mixture may be taken as an indication of the flame temperature in normal circumstances and this affords a convenient basis for comparing the explosive properties of gases and dusts On applying these principles to dust explosions, certain striking anomalies are observed. For example, the calorific value of a lower limit

dust-air mixture can be much lower than that of a lower limit gas-air mixture, the amount of heat involved being quite inadequate to raise both the dust and the air to the ignition temperature of the dust.

This is explained on the assumption that the flame in a dust explosion is not necessarily continuous as in a homogeneous gaseous medium but that each particle of dust in the combustion zone may have its own aura of flame, the explosion flame thus assuming a granular structure in keeping with the medium of propagation. On the other hand, the calorific value of the lower limit mixture can be very much higher in a dust than in a gas, depending apparently on the ignition temperature, or sensitiveness to ignition, of the fuel.

The greater prominence of the latter factor in the case of dust explosions is attributed to the much greater thermal capacity of a solid fuel, particularly in relation to the amount of space it occupies. Attention is drawn to the probable effect of the varying terminal velocities of the dust particles on the mechanism of flame propagation through a dust cloud and the importance of volatility in facilitating ignition and communication of flame is also indicated.

"The Ignition of Dust Clouds by Electrostatic Discharge," by E. G. Cox and A. G. Pearce,

A survey of the available data shows that many dust clouds can be ignited by electrostatic discharges, and that the important factor determining ignition is the energy of the discharge. A rough estimate shows that in industrial processes, under abnormal but by no means impossible conditions, electrostatic charges can commonly accumulate sufficiently to make energies of up to 0.01 joules available for spark discharges, and that charges with energies five to ten times greater are easily possible. These charge accumulations can occur on any insulated conductor, including human bodies.

Ideal Protection

The ideal method of protection against explosion risk in industry in which air borne dispersions of fine dusts are likely to occur, is to prevent the accumulation of electrostatic charges, and to collect and remove the dust generated. Mere earthing of all conductors will prevent the accumulation of "free" charge on them, but this does not prevent the generation and accumulation of charge on non-conducting bodies

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such as rubber belts, or on the material being processed if this is itself an insulator.

Reducing Contacts with Dust in Chemical Manufacture," by L. Marsden, G. W. Robertson and R. A. Storey.

The paper deals with the practical aspect of handling fine powders with particular reference to the manufacture of dyestuffs and intermediates. The reasons for the use of fine powders are given with a general outline of the problem leading up to the development of the designs for equipment. Four main sections are detailed with examples given in each case as follows :-

Two examples are given of simple hoods, one used for the charging of powders from drums into plant items, and the other an arrangement used when transferring pow-

ders from one drum to another.

The second group describes methods for charging powders into process vessels, three examples being given. The first is for charging lime into a lime slaker, the lime being delivered below the level of the liquor, the second is an arrangement of a retractable chute, and the third a vibrating feeder developed for feeding an alkali to give a controlled pH.

A third group gives details of the handling of dusty materials in the course of manufacture, and the three examples are a simple detraying cabinet for emptying dusty and dried materials into drums, a totally enclosed version of a similar type of equipment, and a totally enclosed reversing hag filter for separation of powders from

a gas stream.

The fourth group gives information on a specially developed door where the chemical material processed is alternatively frozen and melted to provide the sealing of the door. Details of a vacuum tight valve used for discharging powders are given and a combined drum discharger, pre-crusher and prescreening device.

Feeding Devices

Four separate devices are described for feeding material from process into packages. These are rotary feed table, a special sealing sleeve to connect between a chute and a drum, a similar device for feeding toxic dusty material into druins mounted on a weighing machine, and an automatic cask filling device arranged to fill material into a series of large packages.

" Particulate Clouds in the Gas Industry," by E. H. M. Badger, B.A., F.R.I.C.

It was found when heating coke ovens by means of producer gas from external producers that the regenerators were becoming blecked by a solid deposit. The producer gas was washed in scrubbers fed by tidal

river water and the gas leaving the scrubbers contained solids which had a high percentage of chlorine, but this chlorine was shown to come not from the water to the scrubbers but from the chlorine in the coke. It was decided to install electrostatic precipitators, but these soon broke down owing to the formation of stalactites across the plates, which could only be removed by scraping. The problem of cleaning the gas was finally solved by evaporating into the gas a quantity of a tar oil, which condensed on the solid particles before they entered the precipitator.

Tar Fog

The condensation of liquid particles on solids also occurs in the formation of tar fog in coal gas or carburetted water gas. The drops of tar fog in high speed exhausters showed that it depended not only on the peripheral speed of the exhauster, but on the temperature of the gas leaving the condensers and also on the design of the condensers,

These two factors are very important in determining the size of the drops entering For good removal it is the exhauster. desirable that a given quantity of tar vapour should condense to a relatively small number of large drops rather than a large number of small drops.

Some light on the formation of liquid drops by condensation from a supersaturated vapour was afforded by the study of nitrogeneous gum in coal gas. The phenomena observed could be explained on the basis that condensation takes piace on particles, on gaseous ions or "spentaneously" (i.e., without nuclei) according to the degree of supersaturation.

Other papers read included:-

" Precautions Against Explosion Fire, ' by G. V. Thom and G. A. V. West; "Dust Problems in Flour Milling," by Leslie Smith; " Dust Problems in the Photographic Industry," by R. G. R. Carnall; Surface Area Measurements in Dust Consurface Area Measurements in Dust Control," by P. J. Rigden; "Dust in Over 2000 Foundries," by W. B. Lawrie (H.M. Inspector of Factories—Engineering and Chemical Branch); "Cosmetics v. Explosives," by Prof. W. M. Cumming and I. A. Brownlie; "Hazards of Explosives Manufacture, by Prof. W. M. Cumming, Dr. F. Rumford and W. G. D. Wright; "Arsenical Dust in Industry," by A. N. Currie; "Manganese Pueumonitis," by Dr. T. A. Lloyd Davies; " La Pénétration Pulmonaire des Toxiques Industriels: Exemple du Bioxyde de Manganese," by Le Doyen Prof. R. Fabra; "The Problem of Dust in the Cotton Industry," by Dr. D. W. Hill

DEPRECIATION AND MAINTENANCE—II

Depreciation Accountancy for Chemical Equipment By S. HOWARD WITHEY, F.Comm.A.

THE cost of maintaining machines and units of equipment in proper working order varies enormously between one operating period and another. This is true, notwithstanding that the technical staffs of most of the leading makers of plant of every description for the chemical, by-product and allied industries are at the service of users for dealing with a variety of sensitive products. Consequently, for the purpose of cost allocation the application of the "straightline" method of determining and recording plant depreciation on the lines exemplified in the previous article is not always satisfactory or equitable.

In some cases, wide fluctuations in the annual charge for upkeep and repairs are avoided by a careful estimate by engineers of the cost over a number of years and by allocating an equal proportion against each In others, the total year's operations. estimated cost of maintenance and the first or original capital cost of the plant give the amount to be spread over the period of service or useful life. So by dividing by the number of years during which the plant is expected to remain in commission at a fixed annual figure is available for inclusion in costs and contracts. The annual expenditure incurred in renewals and replacements is usually debited against a reserve maintained by periodical appropriations from the firm's disposable balance.

Current and Special Expenditure

While care may be necessary to distinguish between the many daily adjustments of a relatively trivial nature and the larger or more costly maintenance jobs-and minor repairs can usually be charged against standing orders and the really big jobs incorporated in specific costings—a general repairs and renewals account is kept by the majority of users of chemical plant, the individual items of expenditure being posted to the debit side as direct postings from the payments side of the cash book. It should never be forgotten, however, that if the book value of a displaced machine or a discarded section of equipment is written off and charged against the productive operations, the full cost of replacement, including transport charges and any installation or foundation expenses should be capitalised by debiting the appropriate asset account.

Unless the most stringent accuracy

is maintained both in the financial books and in the working books, it may be extremely difficult quickly to form proper decisions regarding the installation of new or additional plant or laboratory apparatus to meet urgent requirements. The decisions of chemical engineers in such matters must be governed largely by the behaviour and efficiency of the equipment previously employed on particular work, and the cost of repairs and upkeep involved in the different operations is, of course, always an important factor to be taken into consideration By deducting a fixed percentage from each year's opening book value the burden of plant depreciation and maintenance cau usually be equalised over the period of ser-vice life, because a progressive decline in the amount written off for depreciation would provide the margin required to cover growing upkeep costs.

An Example

For instance, the plant employed by a certain firm of chemical manufacturers was valued at £28,000 for balance sheet purposes at the end of December last, and it was decided that, having regard to the nature and extent of productive operations to be undertaken, the capital value of the firm's assets should be spread over the next six years in such a way that at the end of that time the book value of the chemical plant would be about £14,880. In January. 1948, additional units of plant were installed at a total cost of £5000, and on the advice of engineers it was agreed to write down the book value of these additions to about £3130 over six years. It was also anticipated that the annual cost of repairs, renewals, overhauls and adjustments of the entire profit-earning layout would increase from £250 in the first year to about £1500 in the sixth year.

In order to spread the burden as equitably as possible over the period, the following depreciation computations were finally approved:—

First Year 10 per cent. of £28,000 71 per cent. of £5,000		***		200	£ 2,800 375
Depreciation		***	***	=	£3,175
Second Year 10 per cent. of £25,200	(viz.,	£28,000) less		

£2,800) = 2,520 7½ per cent. of £4,625 (viz., £5,000 less £375) = 347 Depreciation = £2,867 ·II

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Third Year					£
10 per cent. of £22,680			less		
£2,520) 7½ per cent. of £4,278	(viz.	€4.625	less	-500	2,268
£347)				2012	321
Depreciation			***	-	£2,589
Fourth Year					
10 per cent. of £20, 412	(viz.,	£22,680	less		
£2,268)	444	***	***	100	2.041
71 per cent. of £3,957	(viz.,	£4.278	less		
£321)	***	***		=	297
Depreciation				=	£2,338
Fifth Year					
10 per cent. of £18, 371	(viz.,	£20,412	less		
£2,041)	127			200	1,837
7½ per cent. of £3,660	(VIZ.,	£3,957	less		
£297)		***	4.44	270	275
Depreciation	***	***	***	100	£2,112
Sixth Year					
10 per cent. of £16,534	(viz.,	£18,371	less		
£1,837)		***	444	000	1,654
7½ per cent. of £3,385	(viz.,	£3,660	less		
£275)	***			==	254
Depreciation	4.4.4		44.6	(800)	£1,908

The plant account will be credited with the amounts representing depreciation as computed above, each annual total being also recorded on the debit side of depreciation account the balance of which will be transferred to profit and loss. The total sum written off will decrease from £3175 in the first year to £1908 in the sixth year, and at the end of the period the account kept in the firm's private ledger will show the following entries:—

DEB	CHEMICAL PLANT	CCOUL	NT	
1948 Jan.		***	***	£ 28,000 5,000 £33,000
1949 Jan.		***	***	29,825 £29,825
1950 Jan.		***	***	26,958 £26,958
1951 Jan.		***	***	24,369
1952 Jan.		***		£24,369 22,031
1953 Jan.		***		£22,031
1954			-	£19,919
Jan.	. Balance brought down		111	£18.011

1948 Dec.	By	Depreciation written off Balance carried down	***	***	CREDIT £ 3,175 29,825
1949					£33,000
Dec.	15	Depreciation written off Balance carried down	***	***	$\frac{2,867}{26,958}$
					€29,825
1950 Dec.	25	Depreciation written off Balance carried down	***		2,589 24,369 £26,958
1951 Dec.	11	Depreciation written off Balance carried down	***	***	2,338 22,031 £24,369
1952 Dec.	,,	Depreciation written off Balance carried down	***	***	2,112 19,919 £22,031
1953 Dec	11	Depreciation written off Balance carried down	***		1,908 18,011 £19,919

The application of the "straightline" method to the above set of circumstances would result in the sum of £2498 being charged against each year's profits to cover depreciation, this figure being arrived at by deducting £18,011 (estimated book value six years' hence) from £33,000 (the opening capital value) and dividing by six. The combined charge for upkeep and depreciation would then increase each year, while the plant itself is declining in value, whereas the "percentage" method of computation and accounting would provide the margin needed to cover plant maintenance, and would apportion the burden much more evenly, as demonstrated below:—

		Depreciation £	Maintenance £	Total £
1st year	***	 3,175	250	3,425
2nd year		 2.867	550	3,417
3rd year		 2,589	830	3,419
4th year		 2.338	1.080	3,418
5th year		 2.112	1,300	3,412
6th year		 1,908	1,500	3,408

The only real difficulty in applying this method consists of determining the precise percentage by which to reduce each year's opening book value, and as a guide the following table will be found useful; it gives the decimal part remaining at the end of each year up to 25 years after depreciating £1 at varying rates:—

		Per	5 Per	7g Per	10 Per
1	 ***	cent. .9800	cent. .9500	cent. .9250	cent.
2	 	.9604	.9025	.8556	.8100
3	 	.9412	.8574	.7914	.7290

4	***	2.00	.9223	.8145	.7321	.6561
5			.9039	.7738	.6772	.5905
6	***	***	.8858	.7351	.6264	.5314
7	***	***	.8681	.6984	.5794	.4783
×	***	***	.8507	.6635	.5359	.4304
(1)	***	200	.8337	.6303	.4957	.3974
10	***		.8170	.5988	.4586	.3486
11	***	***	.8006	.5689	.4242	.3138
12	***		.7846	.5404	.3924	.2824
13		***	.7689	.5134	.3629	.2542
14		***	.7536	.4878	.3357	.2288
15	***	***	.7385	.4634	.3105	.2059
16			.7237	.4402	.2872	.1853
17	***	***	.7092	.4182	.2657	.1668
18	***	***	.6951	.3973	.2458	.1501
19	***	***	.6812	.3774	.2273	.1351
20	***	***	.6675	.3585	.2103	.1216
21	171		.6542	.3406	.1945	.1094
22	***	***	.6411	.3236	.1799	.0985
23	***		.6283	.3074	.1664	.0886
24			.6157	.2921	.1539	.0798
25	***	***	.6034	.2775	.1424	.0718

For example, the table shows that the plant valued at £28,000 will be reduced to £28,000 by .5314, or £14.879, at the end of six years after being subjected to annual deductions of 10 per cent, based on the diminishing book values, and the general conclusion to be drawn is that when costs of upkeep are likely to expand, the "percentage" method of determining depreciation is much more satisfactory than writing off an equal proportion of the capital cost each year.

On a smaller scale, a somewhat extreme case is that of a firm employing activated carbon adsorption systems for certain processes of extraction, recovery and purification, and which had always been able to obtain the highest efficiencies at relatively low lost. After many years' service, the plant had a book value of £3000 as at December 31 last, and owing to the need for dealing with very sensitive products it was considered advisable to write off this old plant over a period of three years on the assumption that the material and parts would then realise about £650.

The planning department was instructed to prepare a budget for plant maintenance charges over three years, and this showed progressive increases as below:—

PLANT MAINTENANCE CHARGES

				2
1st year	225	***	***	600
2nd year	Les.	***		1,200
3rd year	***	***	***	1,600

Including transport charges and installation expenses, the new plant cost £12,000, and was expected to be worth over £7000 in five years time. As it was desired to incorporate a uniform figure in the contracts on hand, the calculations of depreciation were made us follows:—

First year					£
40 per cent of £3,000		***		mg	1,200
10 per cent. of £12,000	*10	* ***	***	-	1,200
				-	
Depreciation	***	10.5	200	200	£2,400

Second Year 40 per cent of £1,800 (viz., £3,000	loss		£
£1,200) 10 per cent of £10,800 (viz., £12,000	***	1615	720
£1,200)			1,090
Depreciation	4.64		€1,800
Third Year 40 per cent of £1,080 (viz., £1,800	Lans		
£720) 10 per cent of £9,720 (viz., £10,800		200	432
£1,080)		dies.	972
Depreciation		=	£1,404
		-	-

At the end of the three years the distillation and evaporating plant will be made in the manner indicated below;

DISTILLATION AND EVAPORATING PLANT

	ANI
BIT 8 1. To Balance brought down ,, Additions	3,000 12,000
£1	5,000
9 , Balance brought down 1	2,608
£1	2,600
a. "Balance brought down 1	10,800
£1	10,800
i. ,, Balance brought down	9,386
18	£
	2,400
£	15,000
c. , Depreciation written off	1,800
-	10,800
50	2,000
c, Depreciation written off ,, Balance carried down	1,404 9,396
	10,800

By computing depreciation in the manner shown, the annual debit is equalised, enabling the same charge to be made against each year's profits, thus:—

Depreciation Maintenance Total Debit

	£	£	£
1948	2,400	600	3,000
1949	 1.800	1.200	3,000
1950	 1,404	1,600	3,004
	65 604	63 400	60.001

(To be continued. Part 1 of this article appeared of August 21)

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Metallurgical Section

Published the first Saturday in the month

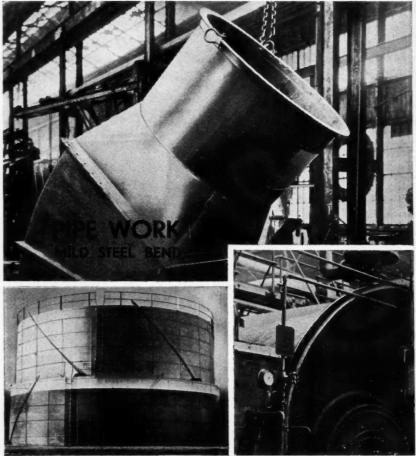
An invaluable reference MOLYRDE PLATINUM CADMIUM **GERMANIUM** OSMIUM PALLADIUM TELLURIU ZIRCONIUM NIOBIUM SIL MUIMDAT RHENIUM ELENIUN BARIUM CAESIUN RUBIDIUM O INDIUM OLYBDENU ESIUM TELLURIU of the TUNGSTEN COBALT GO IRID PRECIOUS AND OTHER METALS GALLIUM PLATINUM RUTHENIUM MOLYBDENU IENIUM BAF ZIRCONIUN PALLADIUM TU TANTALUM UM THALLIUM UM CADM JOHNSON, MATTHEY & CO., LIMITED MUIM SELENIUM TELLURIU 73-83 HATTON GARDEN LONDON E.C. JBIDIUM VANADIU INDIUM RHENIUM IRIC THALLIL INDIUM PALLADIUN ZIRCONIUM RUBIC

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Metallurgical Section

2 October 1948

THE PROSPECTS FOR TITANIUM New Potentialities as an Industrial Material

THE rising interest in titanium as a constructional metal instead of as the base of a pigment or chemical material has been considerably stimulated by the large-scale plans of two U.S.A. companies to raise supplies by the construction of a titanium smelter at Sorel, Quebec (The Chemical Age. September 25).

One of the most remarkable of the facts about titanium, to which little attention has been paid in the past, is that it is probably the seventh most common metal, and the ninth commonest element, in the earth's crust; it is more than a hundred times as

plentiful as copper, zinc, or lead.

Titanium metal, however, is difficult to separate in pure form from its ores; a fact that has kept it practically a laboratory curiosity since its discovery as a chemical element some 175 years ago. As with other metal, it exists in many places but only when found in concentrated deposits is separation of titanium commercially feasible.

Plentiful Resources

Known deposits of rutile and ilmenite, the ores from which it comes, are tremendous both in the U.S.A. and Canada. Some ore is now imported, but the resources here are considered to be large enough to make America independent of overseas supplies. Deposits are now being worked in New York, Florida, Virginia, North Carolina, and Canada.

Titanium metal is relatively so new as an industrial material that little is known about what it will do. Indications are, however, that it can be used where a high ratio of strength to weight is needed. Reports from the Bureau of Mines suggest that an early major use may be in high speed aircraft and other forms of transportation. It may also go into equipment resistant to corrosion and industrial machinery, such as printing presses and textile equipment.

The Du Pont Company are producing and offering it for exploration as a basic raw material for industry and engineering. Meanwhile, their technologists are carrying out preliminary design work to expand production and improve the present manufac-

turing process. Other organisations are also doing research, but much work will be necessary to develop the full potentialities of titanium metal, to determine not only its uses but also its alloying possibilities.

Bright Prospects

If titanium alloys work out as expected, scientists believe they may have a new family of structural materials superior in many ways to any metals or alloys now known.

Technically, the properties of titanium metal are: atomic number 22; atomic weight 47.9; density 4.5; melting point about 3140°F., and boiling point about 9210°F. Its yield strength in annealed form is about 70,000 lb. p.s.i.; in cold worked form, about 100,000 lb. Ultimate tensile strength is 80,000 lb. p.s.i. annealed and 110,000 lb. cold worked.

The Du Pout Company has long used large quantities of the ore to obtain titanium in oxide form for paint pigments. Research leading to its production in metallic form grew out of this experience, and manufacture of the metal is being handled by the pigments department, the process being basically a chemical one.

Most titanium metal which has been available heretofore has been in powder form. Du Pont is producing it now in sponge form and will be shortly producing fagots weighing up to about 100 lb. Reaching not less than 99.5 per cent purity, the metal is ductile (i.e., can be fabricated and shaped by heating and pressure) and can be rolled and drawn readily. It has high resistance to breaking or pulling, and has high strength against distortion.

Samples for Testing

Present price of the Du Pont product is \$5.00 per lb. for quantities of 100 lb. or more in sponge form. Ingot prices will be set later. In the meantime the company has offered to supply small samples without charge to industrial and university laboratories for testing. As the process is improved and if demand warrants mass production of the new metal, the company hopes to be able to reduce the price sharply.

The Phosphating of Metals

Some Processes Recently Patented

A S is well known, the treatment of metal surfaces, especially iron or steel, with a phosphating solution or bath, either by immersion, brushing or spraying, has for many years been largely used as a protection against corrosion. This is achieved mainly by the metallic phosphate coating formed on the surface, but the effect is strengthened if paint is subsequently applied, as the adhesion of the paint and its general protective efficiencey is considerably enhanced by the preliminary phosphating. Treatment with a phosphating solution is also employed as an aid to lubrication between moving netal parts.

Of three recent patents which have now become open to public inspection, in the name of the Pyrene Co., Ltd.—one of the leading British firms in this phosphating technique—the first one, E.P. No. 4509/1948 (Conv. date 9.5.40) relates to the lubrication of metal parts in moving contact, such as the cylinders and pistons of internal combustion engines and in other examples. The parts may be treated with a solution containing dihydrogen phosphates, e.g., of zinc, to which has been added 'nickel or cobalt, or solution of nickel or cobalt dihydrogen phosphates. Oil or graphite may be applied after treatment, e.g., by immersion in colloidal graphite solution (such as "Oildag") heated to about 140° F. and then dried.

Solution Pointage

The phosphating bath may be made up as follows: zinc dihydrogen phosphate 900 lb., zinc oxide 250 lb., nitric acid of 42° Be 750 lb., sodium nitrate 600 lb., and sufficient water to make up to 5000 lb. When 70 lb. of the made-up solution are dissolved in 100 gallons of water a 20-point solution is obtained, containing the ingredients in the right proportion or pointage. Suitable additions are made periodically to keep up the strength. Instead of zinc dihydrogen phosphate that of other metals may be used, namely of cadmium, calcium, strontium or barium. Metal articles so treated are included in claims.

The two other patents relate to the phosphating of the surfaces of aluminium or its alloys. Such treatment of aluminium is a comparatively new development in phosphating, at least as compared with iron or steel, which dates back to the early Coslett methods.

In the Pyrene patent No. 4510/1948 (Conv. date 7.9.40) the claim is to increase paint adhesion and retard corrosion, and

the process is said to afford an improvement on the oxidised aluminium surfaces often recommended hitherto, and to be more economical. The special feature is the addition to the usual bath (zinc dihydrogen phosphate and an oxidising agent such as sodium nitrate) of a double fluoride, say, of sodium, i.e., sodium fluosilicate. The temperature may be 180° F. and immersion time 5 min.; or the temperature may be raised to boiling point, and instead of dihydrogen phosphate, as such, addition to the bath may include barium carbonate and phosphoric acid.

Diverse Methods

In some cases, as when using nickel hydroxide and phosphoric acid, the coatingat boiling point were harder than at 180°; In other cases the converse held, e.g., with cobalt carbonate. Under certain specified conditions time could be reduced to two minutes. In one of the examples free phosphoric acid was used, as such, without addition to or formation in the bath of dihydrogen phosphate. Such a bath containing free acid will pickle the aluminium surface without forming coating, until sufficent aluminium has been dissolved to form dihydrogen phosphate in the solution. A method is also proposed whereby a similar result can be obtained without sacrificing any of the aluminium surface. After phosphating, the articles may be rinsed in the usual way in chromic acid solution and then painted or treated with lubricant, for which they are now strongly absorbent; or they may be left as they are.

The third Pyrene patent, E. P. No. 4662/1948 (Conv. date 10.9.45), is an improved modification of the preceding for coating aluminium or its alloys with phosphates and fluorides, as already described in U.S. pat. 2312855, in which, among others, sodium fluosilicate was given by way of example, and possibility also mentioned of usidg other double fluorides including fluoborates.

It is claimed in the present patent that, as a matter of fact, the fluorborate has been found more suitable, especially for spray phosphating. But it does not retain its initial efficiency for any length of time and the bath has to be repeatedly renewed. A further claim in the present invention, therefore, as the use of fluoborate in boric acid solution and the bath may be renewed by simple addition of either fluoborate or boric acid.

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ELECTROLYTIC METAL POLISHING-II

Advances Derived from French and American Research

From a Special Correspondent

I resems likely that one of the principal industrial fields, as distinct from the purely scientific (physical or metallurgical), for electro-polishing will be in circumstances where ordinary mechanical methods are too cumbersome, difficult or costly; especially in relation to stainless steels of the high-thromium or chrome-nickel type, and for intricate and complicated shapes. In this field, therefore, it may be regarded rather as a supplement than as a substitute for the usual processes.

From the purely polishing or lustreimparting point of view, control and conditions should be such that the projecting portions of the anode surface are dissolved at a much faster rate than the recessed portions. Lustre is then due to such preferential solution of peaks. Light rays directed to unpolished parts are diffusely reflected in many directions, while those directed to the polished surface are reflected substantially in the same direction to an extent depending on the degree of polish.

Most commercial alloys contain more than one solid phase. Carbon steel, for example,

FI Ag

Ba

Ca An

Fig. 1. The first Jacquet cell

consists essentially of iron and iron carbide, each phase having a different potential and hence different solubility in a given electrolyte. An important condition, therefore, is that all the solid phase in preferentially dissolved areas shall be removed at substantially the same rate; and this imposes the main limitation in electropolishing, namely, the difficulty of dealing with multi-phase alloys or metals containing non-metallic inclusions.

Such structures are, of course, subject to preferential attack at one or more of the solid phases and excessive solution of metal surrounding insoluble or slightly soluble inclusions. This results in the finish being marred by voids, pits, or inclusions in high relief (see J. Mazia, Monthly Review of American Electroplating—now Plating—1947, August, pp. 937-944.

Invention to-day is largely directed towards the preparation of electrolytes for specific purposes, on which a considerable amount of work has been done, e.g., at the Battelle Memorial Institute, resulting in several patents dating from 1942. It is interesting to note, too, the close relation between the various protective or anti-corrosion processes grouped under the term phosphating and electro-polishing, and the use of this latter as a preliminary to nickel—or other plating.

Mazia, metallurgist with the American Chemical Paint Co.—one of the leading pioneers in phosphating—points out (loc. cit.) that among the first patents for anodic cleaning of metals was that of Burns and Warner, U.S. Patent 1,658,222, using a phosphoric acid solution (70-100 per cent) at a temperature of 50-100°C., claiming improved methods of cleaning metal surfaces, and using an electrolyte specially adapted to ferrous metals. It was also adapted to preparing metallic surfaces for subsequent nickel-plating, for which the phosphoric solution was particularly suitable.

The very voluminous general and patent literature of phosphating contains many other similar references; but this of 1928 appears to be the first that actually covered electrolytic polishing—or cleaning—as part of the preparation, of a surface for electrodeposition. Jacquet's work, jointly with H. Figour, in the laboratories of the Soc. Le Matériel Téléphonique, is said to have resulted in the discovery in 1929 of the electrolytic polishing process.

There is apparently not much difference in the dates of the independent French and

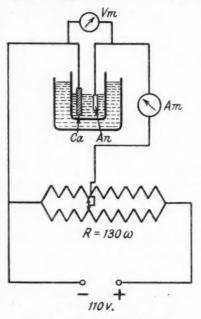


Fig. 2. The modified circuits

American work. Actually, Jacquet begins his book (Vol. 1) with a description of his method, first published in 1937 (Comptes Rendus, 1937, 205, p. 1232), for the electrolytic polishing of aluminium, and subsequently improved in 1943. The original cell is shown diagrammatically in Fig. 1.

The cold water bath as shown there, even with addition of ice, was not always a satisfactory method of temperature control, and the use of a coil acting as cathode was proposed by H. Granjon in a communication to the Société des Ing-Soudeurs (June 19, 1945). This was used for the metallographic examination of welds in light alloys. Another modification was the use of a rotating cathode to produce the required stirring of the electrolyte.

In the improved Jacquet cell special attention was paid to current density, temperature, size of specimens, and addition of perchloric acid or salt to electrolyte. A good deal of experimental work with this was carried out by Odier at the works of the Cie. Alais-Frogues et Camargue, to discover optimum conditions for polishing aluminium. A constant voltage of about 25 was one of them (although the possibility

of using higher potentials is discussed in the method devised by Grandjon and others. Odier's work was of considerable interest, and included the question of the possible inclusion of a potentiometer in the circuit. (Report to the Sub-Committee on Electrolytic Polishing, Paris, 1945). The circuit for Jacquet's modified scheme is shown in Fig. 2.

Several other systems are described, including those of the Aluminium Co. of America, De Sy and Haemers, Aluminium Werke A.G., Hauffe and Tilling, Löwgren and Hildebrand, Meert, Der Mateosiau, von Hamos; and for magnesium, those of Jacquet and the Magnesium Metal Corporations, Ltd.

The risk of using perchloric acid in electrolytes is discussed. The tentative conclusion appears to be that further study of this is required, but that it is difficult entirely to exclude some risk of catalytic or other explosive decompositions.

(To be continued)

Tubing Standards Framed

For Petroleum and Chemical Industries

TWO new British Standards produced in the interests of the petroleum industry have just been issued by the British Standards Institute.

B.S. 1464 for solid drawn aluminium brass and Admiralty mixture brass tubes provides for two classes of tubes for use in condensers and heat exchange equipment and includes approved chemical composition, mechanical requirements and details of tolerances. This standard is intended to replace the American specifications which have hitherto been used for this class of material and will enable British manufacturers to supply tubes required for oversea plants.

B.S. 1465 for flexible metallic tubing applies to tubing for the conveyance of steam, liquid fuels, lubricating oils and liquid asphalt at various temperatures and pressures. Details of construction and dimensions for various temperatures and pressures are given, and the conditions for a hydraulic test are also described.

Copies of the standards may be obtained from the British Standards Institute, 24 Victoria Street, London, S.W.1 (2s. 6d. and 2s. respectively, post paid).

PREVENTING STEEL CORROSION

Cathodic Protection of Underground Structures

SUCCESSFUL tests of electrical methods of protection against underground corrosion are reported by I. A. Denison and Melvin Romanoff, of the U.S. National Bureau of Standards. On six out of eight sites, corrosion of steel specimens was adequately prevented over periods ranging from three to six years by connecting zinc cylinders to the steel.

The tests revealed that the current required to prevent the corrosion of steel electrically was approximately equal to the current associated with normal corrosion and hence could be taken as a measure of the corrosion rate in the soils studied. The bureau concludes that cathodic protection is, under ideal conditions, a highly efficient means of combating corrosion of steel since all of the applied current is utilised in eliminating the local corrosion circuits.

If electric power is available, a cathodic protection unit can be economically installed; but pipe lines transporting oil, gasoline, and natural gas over vast distances often transverse areas of corrosive soils so remote from sources of power that the installation cost of cathodic protection, including the expense of rectifiers, may be great. Fortunately, a source of energy for athodic protection in such areas can be

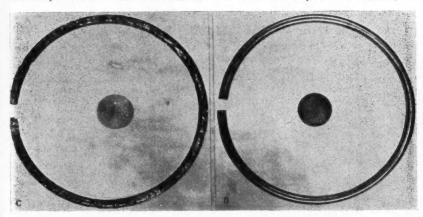
provided by the galvanic corrosion of bars of the electronegative metals, zinc, magnesium, or aluminium, buried at suitable intervals along the right of way connected to the pipe line. (The Chemical Age, July 3.)

In order to investigate the behaviour of zine anodes for cathodic protection in various types of soils, a series of field tests was initiated in 1941 in co-operation with pipeline companies, in which experimental zine-steel couples were installed at eight test sites.

The cathode of the experimental couple was a small steel ring, to which was connected either one, two, or three cylindrical zinc anodes, giving ratios of the area of steel to zinc of 20, 10, and 6.7, respectively. By varying these ratios, the current density on the corresponding cathodes was subject to some control. Unconnected steel rings and zinc cylinders were also buried at each test site.

Degree of Protection

After periods of operation ranging from three to six years, the units were removed and the extent of cathodic protection provided was determined. Out of eight soils in which the couples were installed, six



Showing results of the field tests by the U.S. National Bureau of Standards in a study of cathodic protection against underground corrosion. C, unconnected steel ring and zinc cylinder, exposed for 5.8 years; D, steel ring connected to the zinc anode at the same site for 5.8 years. The steel ring (cathode) in D has conspicuously been protected from corrosion by connection to the zinc anode, which shows some loss of material, due to the flow of a protective galvanic current from zinc to steel

obtained satisfactory protection. Although a zinc-steel area ratio of 1:20 was sufficient for protection at three of these sites, an area ratio of 1:10 was required at the other three.

At the remaining two, high resistivity and high alkalinity of the soil tended to reduce the current output of the zinc anodes to such an extent that cathodic protection was not obtained. However, it is probable that both of these unfavourable conditions could be counteracted by surrounding the zinc anodes with a salt, such as calcium sulphate, which would not only increase the conductivity of the soil but would also prevent the formation of insoluble films or deposits of corrosion products on the zinc surface.

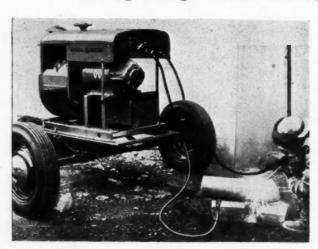
Galvanic currents and electrode potentials were measured at intervals during the course of the tests, while on conclusion, measurements of loss in weight of the steel rings and ainc cylinders, and maximum depth of penetration of the steel rings were made. The average value of the galvanic current, which was just sufficient to prevent corrosion, was found to be approximately equal to the average current associated with the normal corrosion of the unconnected steel rings. Therefore, to prevent corrosion in the localities studied, it is only necessary to apply a current equal to that discharged from the local anodic

In the protection of pipe lines electrolytically, it is obviously desirable to be able to measure accurately the current that will just protect a given area. Otherwise, the pipe rine may be incompletely protected, or, in the event of over-protection, expensive power may be wasted, with possible damage to adjacent structures on which the excess current would tend to collect and discharge.

Estimation of the current required for protection of underground structures of iron and steel is generally based on empirical procedures, none of which can be said to have theoretical justification. In an effort to establish a more scientific method for determining this current, a procedure suggested a number of years ago by the bureau was followed. The potential of the steel rings was measured as increasing current-were caused to flow toward the rings from an external source.

At low currents the potentials of the rings remained constant; but after some transition, the potentials were observed to increase linearly with the logarithm of the applied current. The value of the applied current that was just sufficient to prevent corrosion of the cathodes was found to be indicated approximately by the departure of the potential from the constant value at low currents.

New Light-Weight Mobile Welding Unit



The U.S. General Electric Company's light-weight. engine - driven, d.c. welder, mounted on a pneumatic tyred trailer, shown in use fabricating a large diameter airpressure pipe line. Designed for a wide of general range applications, this welder weighs only 660 pounds affords a maximum of 260 ampères of welding current. It an auxiliary power outlet of 110 volts for the operation of lights and power tools

STABILISING STAINLESS STEEL

U.S. Report on Means of Increasing Resistance

(From Our New York Correspondent)

ORKING on the assumption that the susceptibility of austenitic stainless steel (18-8—18 per cent chromium—8 per cent nickel) to intergranular embrittlement or corrosion may be decreased or climinated, by the addition of titanium or columbium, usually with a stabilising heat treatment, the U.S. National Bureau of Standards has just concluded a study of the problem.

This type of corrosion is particularly pronounced in some 18-8 steels which have been subjected to moderately elevated temperatures —700° to 1400° F.—and are either simultaneously or subsequently subjected to corrosive conditions. The bureau set out to determine the relative amounts of titanium or columbian necessary to stabilise these steels, the injurious effect of carbon content, and the necessity for stabilising heat treatments.

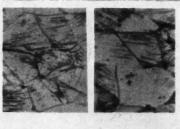




Fig. 1

Using both experimental and commercial steels made to a base analysis of 18 per cent Cr and 10 per cent Ni, the effects of variations in carbon content, in the ratios of columbium to carbon and of titanium to carbon, and of different heat treatments, were studied.

The test ordinarily used to induce susceptibility to intergranular attack consists of heating the steel for 2 hours at 1200°11250° F. (the sensitising treatment), followed by exposure for 2 days to a boiling solution of 100 ml. H₂SO₄ (sp. gr. 1.84), 100 g. CuSO₄, 5H₂O, and 900 ml. distilled water. The specimens are then dropped on a steel plate to note whether they have lost their metallic ring, and are bent 180° over a rod whose diameter is equal to the thickness of the sample. The outer surfaces are then examined for cracks.

Steels which are immune to intergranular embrittlement have an unimpaired metallic ring and show no cracks after bending. Extremely susceptible steels lose their metallic ring completely and crumble on bending. In addition to these tests, all specimens studied were subjected to metallographic examination as well as to measurement of electrical resistivity, since intergranular corrosion increases this property considerably.

Sensitising Test

The investigation included a variety of test conditions, some of them quite severe, to study susceptibility to intergranular attack. Specimens were sensitised at temperatures ranging from 840 to 1380° F. for periods up to 21 days, and then exposed to the boiling acidified copper sulphate solution for 14 days. It was found that the most severe sensitising treatment was 8 or 21 days at 1020° F. Compared with this, the commonly specified treatment of 2 hours at 1200° F. is relatively mild.

Considering the steels which contained no stabilising elements, the tests showed that all were vulnerable to intergranular attack. Decrease in carbon content, however, decreased the degree of vulnerability.

In the columbium and titanium-bearing steels, carbon content within the range of 0.06 to 0.13 per cent had no influence upon the resistance to intergranular attack, except as it influenced the Cb/C or Ti/C ratios. Steels varying in carbon content but having similar ratios of Cb/C or of Ti/C had approximately the same degree of susceptibility to

(Continued overleaf)

U.K. Production and Stocks of N-F Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United

UNWROUGHT COPPER

	Blister	Refined
OPENING STOCKS:	Copper	Copper
Govt. and consumers'		
stocks	29,348	70,560
Imports into U.K	17,804	18,139
PRODUCTION:		
Primary		10,872
Secondary	1,573	4.376
CONSUMPTION:		
Primary	10,954	25,602
Secondary	Account)	12,003
EXPORTS FROM U.K	1.105	4
CLOSING STOCKS:		
Govt. and consumers'		
stocks	35,139	79,982

GROSS OUTPUT OF MAIN COPPER, ALLOY

AND P	ROD	CCTS			
Unalloyed copper products		***	23,536	long	ton
Alloyed copper products			20,631	22	19
Copper sulphate			703		

UNWROUGHT ZINC

	Zinc in Concentrates Slab Zinc			
OPENING STOCKS:	(estimated gross zinc content)			
Govt. and consumers stocks	23,885	. 52,390		
PRODUCTION :	5,463	13,764		
Virgin and remelted CONSUMPTION:	-	6,045		
Virgin (incl. debased) Remelted and scrap	7,465	15,743 5,516		
EXPORTS CLOSING STOCKS:		59		
Govt. and consumers stocks	21 417	61,341		

Kingdom in August are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

	LE	A.D		
		Long	Tons	
OPENING STOCKS: Govt. and con-	Lead in Concen- trates	Imported Virgin	English	Content of secondary scrap and Residues
sumers' stocks	-	20,122	2.190	-
IMPORTS		16,618	and a	boston
PRODUCTION	. 149	-	2,293	-
CONSUMPTION	. 149	12,895	2.158	9.390
EXPORTS CLOSING STOCKS:	-	40	-	-
Govt. and con-				

Long Tons

23,701

9 395

| GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD | 10,282 | IMPORTS | 2,783 | CONSUMPTION | 1,608 | EXPORTS AND RE-EXPORTS | 151

TIN METAL

sumers' stocks

ANTIMONY

		Long Tons
TOTAL CONSUMPTION OF ANTIMONY	METAL	
AND COMPOUNDS		371
TOTAL CONSUMPTION OF ANTIMONY I	N SCRAP	356

CADMIUM Long T

TOTAL CONSUMPTION OF CADMIUM ... Long Tons 55.40

STABILISED STAINLESS STEEL

(Con'inued from previous page)

intergranular attack, regardless of the total carbon content. The steels showed greater resistance to attack when annealed at 1800° F. than when annealed at 1975° F.

Stabilising heat treatment at 1600° F, had a negligible effect upon the resistance to intergranular embrittlement of the columbium-treated steels so that these steels carrying a sufficiently high ratio of Cb/C may be used without stabilising by heat. However, the performance of the titanium-treated steels carrying the higher ratios of Ti/C was markedly improved by such treatments. When properly treated, substantially complete immunity to intergranular attack may be obtained with a minimum ratio of Cb/C=10 and Ti/C=5. For more "foolproof" immunity, these ratios should be 12 and 8, respectively, the bureau reports.

The type of distribution of the precipitated carbides resulting from the sensitising

treatment is not an infallible indication of the resistance to intergranular embrittlement. Steels in which the carbides were irregularly distributed were usually resistent to intergranular attack. However, the susceptibility of steels containing carbides at the grain boundaries, even though these carbides were distributed as a continuous network depended on the time-temperature relationship during sensitised hours at 1200° F. and the other 2 days at the same temperature, were indistinguishable on examination of their microstructure (Fig. 1, A and B). Both showed a precipitation of carbides at the grain boundaries and on various slip planes. Their behaviour after exposure to the boiling acidified copper sulphate, however, differed radi-cally (see Fig. 1, C). The specimen that had been sensitised for 2 hours suffered severe intergranular corrosion after 2 days' exposure, while that sensitised for 2 days showed no evidence whatever of intergranular attack, even after 14 days' exposure.

DETERMINATION OF IRON AND MANGANESE

Recent Findings of Russian Chemists

IN tin alloys, lead alloys, brass and bronze small amounts of iron may be simply and speedily determined by treating the acid solution of the alloy with granulated zinc to precipitate metallic copper, tin, antimony, etc., and determining the iron in solution with

sulphosalicylic acid.1

The method for tin-base Babbitt, brass and bronze is as follows: Dissolve 0.5 g. of sample in a mixture of 5 ml. of concentrated hydrochloric acid and 2 to 3 ml. of concentrated nitric acid, wash down the cover and sides of the beaker, and evaporate the solution to dryness. Cool, add 5 ml. of concentrated hydrochloric acid and repeat the evaporation, Then add 7 ml. of concentrated hydrochloric acid, heat gently to dissolve the salts, dilute with 53 ml. of water, and introduce 4 g. of granulated zinc. Cover the beaker and warm gently for 30 to 40 minutes. With brass and bronze this treatment is continued for 15 minutes after the solution becomes decolorised.

Filter off the precipitated metals, and wash the latter two or three times with cold water. Heat the filtrate to boiling point, oxidise the ferrous salts by adding 5 to 6 drops of perhydrol, and completely boil off the excess of peroxide. Cool the solution, transfer it to a graduated flask (100 ml.), add water to

the mark, and mix well.

Transfer 15 to 30 ml., depending on the iron content, to a flask, add 3 to 6 ml. of 5 per cent sodium tartrate solution, aqueous ammonia solution (about 10 per cent) until the basic zinc salts first precipitated are dissolved; then add 7 ml. more. Treat with 25 ml, of 10 per cent sulphosalicylic acid solution, make up to exactly 100 ml. with water, and compare the colour with standards.

The standard is prepared from a mixture of 53 ml. of water and 7 ml. of concentrated hydrochloric acid, taking 15 to 30 ml., as in the test. Add 3 to 6 ml, of sodium tartrate solution, neutralise to congo-red indicator with 10 per cent ammonia solution and add 7 ml. excess of the latter. Then add 25 ml. of 10 per cent sulpho-salicylic acid solution and dilute to 100 ml. Match the colour of the test solution by adding dropwise from a micro-burette a standard solution of ferric alum, of which 1 ml. is equivalent to 0.05 mg. of iron. The standard ferric solution is prepared by dissolving 0.432 g. of ferric alum in water acidified with 4 ml. of concentrated sulphuric acid, and diluting to 1 litre with water.

Alternatively, the colour intensity may be assessed by means of a photocolorimeter.

The method for lead-base Babbitt is as follows :-

Dissolve 0.5 g. of the metal in 2 to 3 ml. of diluted nitric acid solution (1+1), add 5 ml. of concentrated hydrochloric acid, boil until the undissolved matter becomes white, evaporate to dryness, add 5 ml. of hydrochloric acid, and repeat the evaporation. Heat with 7 ml. of hydrochloric acid and 53 ml. of water to dissolve the salts, cool. filter off the precipitated lead chloride, and with diluted hydrochloric (7+53). Add 4 g. of zinc, and proceed as described above.

Manganese in Iron and Steel

If phosphoric acid is present in a solution containing manganese, the latter may be oxidised completely to permanganic acid by ammonium persulphate alone. The need for silver nitrate is thus avoided.2

The determination of manganese in steel

or cast iron is carried out thus:-

Dissolve 0.2 g. of the sample in 50 ml. of an acid mixture prepared from 420 ml, of concentrated sulphuric acid, 160 g. of sodium phosphate, and 420 ml. of water. After dissolution, add concentrated nitric acid until the oxidising reaction ceases, evaporate to copious fumes of sulphur trioxide, cool, add 200 ml. of water, and then 50 ml. of 25 per cent ammonium persulphate. Boil for minutes to oxidise the manganese and to decompose the excess of persulphate; cool, and titrate with standard sodium arsenite solution.

SOURCES

¹ Rapid Colorimetric Method of Determining Iron in Babbitt Methal, Brass and Bronze. (E. I. Fogelson and N. V. Kalmykova, Zavod. Lab., 1946, 12, 973-974).
² Determination of Manganess by the Persulphate Method but without Silver Nitrate. (I. M. Engalychev and L. N. Ositkovskaya, Zavod. Lab., 1946, 12, 980).

Belgian Steel Boom

The Belgian iron and steel industry is at present receiving the largest inflow of orders since the end of the war. Apart from the recent agreement with the U.K. for the delivery of 100,000 tons of steel, an order for some 50,000 tons has been placed by Czechoslovakia, Denmark has ordered an additional 25,000 tons and Argentina has contracted for 55,000 tons of material for ferro-concrete construction purposes. U.S.S.R. has also placed new orders. Further orders are expected to result from ERP.

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GROWTH-RESISTANT IRON

THE problem of the "growth" of iron used for making castings when repeatedly heated to high temperature; is reported to have been overcome by metallurgists of Batelle Institute after several years of study. The new iron produced is said not to warp or buckle as a result of parts enlarging or shrinking with changes of temperature. This "growing" is not ordinary thermal expansion, but is the result of a change in structure within the metal.

Research for this new growth-resistant cast iron was sponsored by the Jackson Iron and Steel Company, Jackson, Ohio, which will market the silvery pig iron for its production. The casting is a high-silicon iron, silicon being the element which causes the resistance to growth; minor amounts of copper and chromium are added to make the product resistant to scaling at high temperatures.

The iron maintains satisfactory growth, scaling, and impact properties up to 1700°F.

Lead and Uranium Discoveries

The distinguished Danish Arctic explorer, Hr. Lauge Koch, returning from his Greenland expedition, reports that near King Oscar Firth on the east coast huge quantities of lead were found, estimated at 1 million tons, which could make Greenland the world's third largest lead supplying country, states The Times' correspondent from Copenhagen. The lead deposits are to be examined on next year's expedition, but no quick developments are expected as it would be necessary to build a special settlement for the export workers. Hr. Lauge Koch also reports that he has made discoveries of uranium but that it is still too early to estimate the quantities.

Increasing S.A. Copper Production

Increased copper production is reported at Northern Rhodesian mines. The foundations are being laid of a new plant at Nchanga to double production, the com-pletion of which will have to depend to a large extent on the availability of materials from Britain. The Tsumeb plant in S.W. Africa went into production in record time by getting supplies from the U.S.A. Mufulira works are also increasing plant and output considerably.

Bauxite Resumption in Malacca.-According to a report in the Dutch economic daily, Economische Voorlichting, bauxite mining, which has been interrupted since 1945, is to be resumed in Malacca.

Next Week's Events

MONDAY, OCTOBER 4

Society of Chemical Industry, first meeting of the session, London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. Dr. H. Baines: "The Photographic Latent Image."

MONDAY, OCTOBER 4-11

Scientific Film Association, 34 Square, W.1. International Congress.

TUESDAY, OCTOBER 5

Society of Chemical Industry (Fine Chemicals Group), Royal Institution, Albemarle Street, W.1, 7 p.m. Prof. J. H. Burn: "Fine Chemicals for Medical Use"

WEDNESDAY, OCTOBER 6

Society of Public Analysts, Gas Industry House, 1 Grosvenor Place, W.1, 7 p.m. M. M. Muers and M. A. House: "Ether Peroxide as a Possible Source of Error in the Rose-Gottlieb Butterfat Test '; R. Aschaffenburg and J. A. Hall: "Standardisation of Hortvet Thermometers "; K. A. Williams: "Use of Reichert, Polenske and Kirschner values in the Determination of Butterfat, Coconut Oil, and Palm Kernel

WEDNESDAY, OCTOBER 6

Pharmaceutical Society of Great Britain, 17 Bloomsbury Square, London, W.C.1, 3 p.m. Opening of 107th session of the college and presentation of prizes.

THURSDAY, OCTOBER 7

Oil and Colour Chemists' Association London section), Royal Institution, (London section), Royal Institution, Albemarle Street, W.1, 6.30 p.m. Prof. H. J. Emeleus: "The Impact of Radioactivity on Inorganic Chemistry-II, The Experimental Study of Radioactive Sub-

Royal Institute of Chemistry (London and South-Eastern Counties Section), Technical College, Dagenham, 7 p.m. M. N. Booth: "Careers for Chemists."

SATURDAY, OCTOBER 9 Institution of Chemical Engineers (North-Western Branch), College of Technology, Manchester, opening meeting of session, 2 p.m. W. S. Norman: "Fluid Friction, Heat and Mass Transfer in Turbulent Flow,"

Engineering and Equipment

The Engineering, Equipment and Materials Exhibition is to be held at the Old Horticultural Hall, Vincent Square, Westminster, London, S.W.I, from January 26 to February 9, 1949, inclusive. It was originally planned to hold the exhibition in October this year, but the new dates have finally been decided upon as being most suitable for exhibitors and overseas buyers.

Turkey's Bid for Industrial Sufficiency

State Plans to Expand Electricity, Steel and Chemicals

OF the three five-year plans initiated in Turkey, to foster research and industrial development, the first two were largely inoperative because of the war and other factors. The third began in 1946 and serious attempts are being made to implement it fully despite many difficulties. It will include practically the whole industrial field, although certain sections, such as textiles, power stations, iron, steel, coal, and cement will have some priority. A sum of £T.600 million has been allocated, and it is hoped to supplement this from American credits and advances from the International and Export-Import banks.

Expenditure on Transport

Much of the £T.600 million has, in fact, already been expended on transport and other basic needs. Expenditure is mainly in the hands of the State through the Sumer and Eti banks. The former controls the iron, cement, sugar, chemical and allied industries, while the Eti bank looks after mining operations—chrome ore, iron, oil-shale, pyrites and copper, also electrical plant and power stations. Mineral prospecting is in the hands of another State institution, the M.T.A. Bank. The following summary is based chiefly on an interesting report by Dr. V. v. Haken. (Angew. Chem. 1948, 20, B. 145-147.)

Ambitious schemes had been envisaged for the heavy chemicals industry in the earlier plans, but the scale has had to be somewhat reduced. Schemes include nitrogen fixation for ammonia, nitric acid, etc., in Kütahya, with a capacity of 30-40,000 tons per annum, presumably in terms of nitrogen; alkali electrolysis at Izmit (Sea of Marmora) for caustic soda (6000 tons), and a new soda factory in Istanbul (20,000 tons); sulphuric acid in two factories at Karabük and Ankara, by the contact process, also a third (lead chamber) plant in Istanbul; tar products Karabük; insecticides, including DDT soap and cosmetics, sulphur, rubber goods. Some of these are already old established, others are only in the discussion stage.

The iron and steel industry is centred in Karabük, where some of the plant was installed by an English firm during the first five-year period. These are to be extended at a cost of £T.8 million and output of cast iron raised to 160,000 tons per annum and of steel to 200,000 tons, thus supplying about half the home require-

ments. Although plant and equipment are of the most modern design it is not well situated in respect to ore and coal supplies, so that production costs are thereby increased. However, in the interests of autarchy, and possibly of military defence, they must be maintained at any cost,

Some coal mines are situated at Zonguldak, on the Black Sea, in the neighbourhood of a large power station, and, with the aid of American equipment, are to be intensively developed. Coal output increased to 4 million tons in 1946, and is to be raised to 8 million tons per annum. The present small export trade in coal it is also hoped to enlarge. The coal mines, like the iron and steel works, are said to be running at a loss, under State control. Cement is made principally in the Sivas district, where four factories produce about 400,000 tons per annum-about two-thirds of the home demand. The Sumer Bank has decided to erect two more cement works so that the need for imports may be It is hoped to obtain some eliminated. equipment from the British zone Germany.

Power stations, of course, occupy an important place in the plan. Two, at least, are under construction, and three more are proposed. One, as already stated, is near the Zonguldak coal mines—the Catalaghi station—and will supply with power the Karabik iron and steel works and other users. It was hoped that, this year, capacity available would reach 120,000 kW., and that eventually the output figure would be 250 million kWh per annum.

Fuelling with Shale Oil

The Tuncilek power station, now under construction, will be fuelled with shale oil or derivatives. Its output by 1950 should reach 80,000 kW, and users will include mines at Tuncilek, a nitrogen fixation factory, and cellulose works in Izmit, as well as the town of Istanbul for lighting, etc. Three hydro-electric schemes have been proposed on the rivers Sakarye. Kadincik, and Sariyar, with outputs respectively of 150, 150, and 440 mill, kWh.

Sugar production from beet occupies several small works in Alpula (Thrace). Eskisehir, near Kutahya, and Turhal. These are fairly modern and well equipped, with total output of 100,000 tons per annum, or a little short of home requirements. Some extension is proposed, including cane sugar from Adana plantations.

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AMERICAN AID FOR SCIENCE More Equipment for European Workers?

R. KARL LARK-HOROVITZ, general secretary of the American Association for Advancement of Science, recently returned from a two-month visit to Europe, where he toured laboratories in Great Britain, Sweden, Denmark, Switzerland and Holland. Dr. Laric-Horovitz has stated in the U.S.A. that the Marshall Plan can prove of great value to scientists in Europe by enabling them to import scientific equipment.

Although scientific research was recovering from effects of the war, he said, there were still a number of handicaps to be overcome, including fuel shortage, lack of equipment, of textbooks and of teachers. It would be beneficial to European scientists if the United States could send them some of our surplus micro-waves equipment, widely needed in purely academic research in structure of molecules, atoms and nuclei.

'I am full of admiration for the work being done in Europe today, especially in Denmark, Holland and England,' he said. "I was impressed with the excellence of their research and their enthusiasm despite their many hardships and restrictions. Escarch being carried on in Great Britain is one of the most exciting of all scientific centres today. In all English laboratories there is not only a great deal of research work going on, but it is work of the highest quality."

Emphasis in scientific research throughout Europe, he reported, is on precision work such as electronics, new photographic techniques as applied to nuclear physics, and physical measurements as applied to various fields. Both the Netherlands and Denmark, he found, carried on research devoted to modern theoretical physics during their occupation in spite of many difficulties.

"Another development in Europe that amazed me," he declared, "was the tremendous activity and interest in international scientific conferences, at which scientists from all over the world participated."

A native of Vienna and a graduate of the university there, where he specialised in physics and physic-chemistry, Dr. Lark-Horovitz has been with the physics department at Purdue University since 1928. He is credited with outstanding work in the fields of X-rays, crystal structures, nuclear physics and radioactive tracers.

84.4 Million of Chemicals

Total grant authorisations approved by the United States Economic Co-operation Administration for European Recovery Programme countries and for China, now total almost 1500 million dollars. France has so far received the largest amount, with the United Kingdom second, and Italy third.

Of the goods approved for Britain up to the end of August, food and agricultural items represented 64 per cent. Among the industrial items the following allocations (in million of dollars) are of interest: nonmedical chemicals and related products 4.4; pulp and paper 5.5; non-ferrous metals 32.5; iron and steel mill products 3.3; iron and steel mill products 3.3; petroleum and products 44.

Authorisations approved for Europe for the week ended September 8 (in millions of dollars) included: Italy 2.9 for copper from Chile; France 5.7 for shelled peanuts from the United States; Bizone Germany 2.3 for electrolytic copper from the United States; Austria 2.1 for sugar from Cuba.

Explosion Tests

300 Tons of Ammonium Nitrate

EXPERIMENTS with 300 tons of ammonium nitrate involving considerable risk are being undertaken by British experts on Dune island, near Heligoland, in an endeavour to prevent explosions of the substance in store or during transport. The research is being undertaken by the Ministry of Supply as a result of the disastrous explosions in 1947 when two ships laden with ammonium nitrate blew up—one at Texas City on April 16, and the other at Brest on July 27. The experiments are being conducted under official auspices, but it is anticipated that some of the findings will become available to industry.

N-F Metal Supplies No Price Reduction Expected

BELIEF that prices for lead, zinc, and copper would not fall for some considerable time was expressed by metal producers attending the annual convention of the American Mining Congress in San Francisco. In London, final allocations of tin metal for the second half of 1948 amounting to 11,980 tons have been made by the Combined Tin Committee. Together with allocations previously announced the total for this period amounts to 43,590 tons, according to the Ministry of Supply. Final allotments in tons were: United States 5120; France 1320; Japan 1170; India 660; Canada 540.

PERSONAL

M.R. B. L. METCALF has been appointed chief mechanical and electrical engineer in the production department of the National Coal Board. He is at present technical director of the Brush Electrical Engineering Company, Loughborough, who have agreed to release him for service with the Board from December 1. Mr. Metcalf, who is 47, was educated at Oundle School and Glasgow University, later obtaining an associateship at the Royal Technical College, Glasgow. From 1923 to 1939 he was with Metropolitan-Vickers, Ltd., and for the past five years head of their mining department. He was chief electrical engineer of Powell Duffryn, Ltd., from 1940-1945.

A remarkable record of service was recognised at Stevenston, Ayrshire, last week, when MISS MARGARET MACKENZIE, received a presentation from her fellow-workers on retiring from the I.C I. factory at Ardeer after 49 years' service. She entered the employment of Nobel's Explosives Company at Ardeer on the day the South African War started, and has trained many girls in the work of the department. She has received all the long service awards offered by I.C.I. Dr. J. W. M'David, chairman of this division of I.C.I., expressed the company's thanks to Miss MacKenzie.

At the annual general meeting of the Irish Chemical Association in Dublin, on September 22, the following officers and council for the 1948-49 session were elected: President, Prof. T. S. Wheeler; vice-president, D. Crowley; hon. secretary, G. F. O'Sullivan; hon. treasurer, J. G. Belton. Council: Messrs. V. C. Barry, T. G. Brady, Prof. W. Cocker, Prof. T. Dillon, Mr. W. V. Griffiths, Miss M. MacNeil, Mr. N. V. Nowlan, Mr. F. T. Riley.

SIR CHARLES TENNYSON, C.M.G., secretary to the Dunlop Rubber Company since 1928, has retired as from October 1. He is president of the British Association for Commercial and Industrial Education, chairman of the FBI Education and Industrial Art Committee, and a member of the Council of Industrial Design. He will continue to assist Dunlop's in an advisory capacity.

DR. Frank Frank celebrated his eightieth birthday on September 27. Formerly a professor at the Technical University, Berlin-Charlottenburg, he was also for many years head of an important laboratory engaged on industrial and technological research. Dr. Frank, well-known for numerous publications in the fields of rubber technology.

plastics, benzol and tar products, coal processing and utilisation of asphalt, and wood tar distillation, is still very active and able ha to give his experience and advice to Franks Laboratories, Ltd., which he helped to go found.

MISS W. G. KEEPE, appointed to a Wellcome Pharmaceutical Research Fellowship a Lyear ago, has been awarded the Fellowship U for a second year at Manchester University. U where she has been carrying out whole-time research on penicillin. A second Fellowship has been awarded to Mr. D. W. WYLE at Glasgow University where he is engaged in pharmacological research. The Fellowships are for £350 a year.

SIR FREDERICK BAIN had conferred upon him, by King Frederik of Denmark, the Order of Dannebrog, after the opening of the British Exhibition in Copenhagen, which closes tomorrow (October 3).

MR. ALBERT HOWARTH, lecturer in textile chemistry at Manchester College of Technology, has been elected by the council to associateship of the Textile Institute.

MR. A. R. CREW has been appointed publicity manager of Monsanto Chemicals, Ltd.

Obituary

The death has occurred, at his home in Cambuslang, Glasgow, of Mr. William Robert Blair, chairman of the British Ironfounders' Association, the British Bath Manufacturers' Association, Ed., and the National Light Castings Ironfounders' Federation since 1930. His association with the light castings industry dates from his appointment in 1919, as assistant secretary of the National Light Castings Ironfounders' Federation, in which he assumed progressively increasing responsibilities. During the war he served for a time with the Iron and Steel Control.

MAJOR SIR THOMAS CROZIER, who died at Folkestone on Sunday, aged 80, had rendered distinguished service throughout his career as an explosives inspector, and for a long period was Chief Inspector of Explosives at the Home Office, after service as an Army artillery specialist at Woolwich.

The death has occurred at Largs, Ayrshire, of Mr. WILIAM HUTTON CATHCART, of Bishopsbriggs, Glasgow, who for 26 years was a metallurgist with Lobnitz and Co., Ltd., Renfrew. He retired in 1944.

Home News Hems

Cheaper Oiticica Oil .- The Board of Trade d able has announced that from October 1 the price ranks of oiticica oil is to be reduced from £175 to ed to £150 per ton ex store.

I.C.I. to Distribute Furfural.—As from Well October 1, Imperial Chemical Industries, ship a Ltd., will act as sole selling agents in the wship United Kingdom for furfural produced in the U.S.A. by the Quaker Oats Co., of Chicago.

> Houses for Key-workers .- In view of the proposal to erect houses for key-workers in the Skelmersdale area, C. T. Brock and company (Crystal Palace) Fireworks, Ltd. are planning to establish a factory at White Moss, Skelmersdale.

> Auxiliary Power Needed.—The Ministry of Fuel asks industrial and other undertakings which own auxiliary electrical generating plant to use it to relieve the public supply at least during the hours 8 a.m.-12 noon and -5.30 p.m. from the beginning of this month to the end of March.

> Steelworks Rescue.-When two steeplejacks dismantling a 200 ft. chimney were overcome by flue gas, five steelworkers at the Redbourne Steel Works, Scunthorpe plant of Richard Thomas and Baldwin, Ltd., climbed to them by the iron ladder and lowered the unconscious steeplejacks by

> Argentina Steel Order for Britain.—An order valued at £6 million has been placed by the Argentine Government with British steel rail makers. The order for 250,000 tons of steel rails and fish plates is to be delivered over six years. Firms on the north-east coast of Scotland and South Wales will benefit.

> Coal Output up 80,000 Tons .- The total coal output last week was up by 80,000 tons on the previous week. The figure of 4,125,600 tons, however, is still well below the target tonnage which on the week represents 50,900 more tons. Last week's total compares with 3,897,700 tons in the week ended September 27, 1947.

New Glucose Prices .- The Minister of Food has made the Glucose (Control and Maximum Prices) Order, 1948, to replace that of 1943. The new order, which comes into effect on the 10th of this month, provides for an increase of 14s, per cwt, in the first hand selling price of liquid glucose following the recent increases in prices charged to glucose manufacturers for maize and maize starch.

Change of Address.—Ainsley (Industrial Instruments), Ltd., has moved from South Norwood to North Circular Road, West Twyford, N.W.10.

New Telephone Service.—Telephone service with Iran (at present limited Teheran) has been opened and is available from 6.30 to 8.30 a.m. GMT daily, except Fridays and Sundays. Charge for a call of three minutes is £3.

Chemist Found Dead .- Mr. Research Peter George Carter, research chemist of I.C.I., Blackley, Manchester, was found dead near his home, Alkrington, Middleton, on September 20. A phial of liquid and a note were also found.

Reduced Price of Liquid Rosin.—The Board of Trade has announced that, as from October 1, 1948, the selling price of liquid rosin distributed through the agency of the Liquid. Rosin Importers' Association, Ltd., will be reduced by £6 per ton, to £32 per ton ex United Kingdom warehouse.

Census of Distribution.-The Board of Trade has now made an order fixing 1950 as the year in which the first full Census of Distribution will be taken. It will be compulsory, will be taken early in the year in respect of the year 1949 and will involve wholesalers, retailers and other services.

Telephone Apparatus for Export.-More than two-thirds of the telephone apparatus and cables being made in this country are Most of the taken by orders overseas. remainder is used to serve public utility and health services, export industries, food producing and other essential needs, states the GPO.

Awards for Enterprise.—Sums totalling £486 have been awarded by the Post Office during the quarter ended June 30, 1948, to members of the staff in respect of 197 suggestions submitted for improving the ser-Since 1906, when the scheme was introduced, more than 125,000 suggestions have been received and over £40,000 paid in awards.

Lead Mining Revival.—An attempt to revive the lead mining industry on a cooperative basis is being made by 100 men at Wirksworth, Derbyshire. It is proposed to establish a corporation to operate a machinery pool and centralised pumping plant, seek cheap power and rates remission during development work, and build a central lead treating plant to handle the output of small mines economically and avoid too many spoil dumps.

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Overseas News Hems

Czech Iron and Steel Pigures.—Czechoslovakia produced in the first half of this year 1,323,153 tons of raw steel, over 920,000 tons of rolled products and over 810,000 tons of pig iron.

German Lead Mines.—After being idle for three years, the Mechernich works at Eifd, the oldest lead mines in Germany, have recently resumed operations. An annual output of 7000 tons is expected to be reached by the end of the year.

Norway-Gzechoslovak Trade. — Fish oil zinc, carbide, casein and industrial chemicals are to be shipped by Norway to Czechoslovakia under a recent trade agreement. Return shipments of glass, machinery, foundry products and textiles have been stipulated.

Chinese Metal Exports.—The total value of all metals and ores exported from China in the first quarter of 1948 amounted to 2,729,000 dollars. Exports included: wolfram concentrates 2192 tons; tin ingots and slabs (principally from Canton) 801.6 tons. Shipments of antimony regulus was 1722 tons.

New Department of Koppers Company.— The Koppers Company, Inc., Pittsburgh, has set up a new chemical section to supervise and co-ordinate engineering and construction work on contracts for the crection of plants to produce oxygen, synthetic fuels, and certain types of chemicals.

Search for Uranium in Colorado.—Attempts are being made to find uranium deposits in the Colorado plateau, states Mr. John K. Gustafson, Director of Raw Materials of the United States Atomic Energy Commission, recently. He described the United States' dependence on foreign sources for uranium supplies as "a source of danger in a troubled world," states a Reuter report from San Francisco.

European Steel Output.—The steel committee of the Economic Commission for Europe records a marked improvement in the European output of steel for the first lialf of the present year. It was 27 per cent higher than the average monthly production total in the corresponding six months of 1947, and represented 53 per cent of the expected total output for the year. If the present rising production in Europe continues, it is estimated that the year's output will be from 6 per cent to 10 per cent above the target, or 45 million tons of steel instead of the expected 41.5 million tons. This is about 11 million tons more than in 1947.

New Oil Drillings in W. Germany.—Two new oil wells which have recently been drilled in the Emsland, adjoining the Dutch frontier, are reported to have increased West Germany's daily output of crude oil by 200 tons.

Rumanian Mining Developments.—Important deposits of kaolin are reported to have been discovered in Rumania recently. Successful results have also been reported relating to the search for coal in the Jacobeni area.

German Plant for Reparations.—The Deutsche-Messapparate, Gmbh., plant for the production of fuses at Hamburg/Langenhorn has been listed as available for distribution by the Inter-Allied Reparation Agency.

Graphite Refining in S. Africa.—After some six years of preliminary work, the South-West Graphite Mining & Refining Co. has recently erected a graphite refining plant near Krugersdorp. This plant is said to be the most modern of its kind at present. It is to be in full operation at an early date.

New Zealand Iron and Steel.—Experimental smelting of the iron sands which abound on the west coast of North island is shortly to be carried out under the auspices of the New Zealand government. It is hoped this may lead to the establishment of an economic iron and steel industry for New Zealand which suffers from a lack of heavy industries.

Pitchblende Found in Canada, — Mr. Brockelbank, Canadian Provincial Minister of Resources, has announced that two Saskatchewan prospectors have discovered "high-grade veins of pitchblende" in the Blacklake area, 400 miles north of Laclaronge, adding that the strike appears to be the "greatest since the Great Bear Lake discovery of 1930."

I.C.I. Merchanting Organisation. — The formation of separate states of India and Pakistan has obliged I.C.I., Ltd., to make changes in the organisation of its interests in that area. As from October I, 1948, Imperial Chemical Industries (India), Ltd., will cease to trade in Pakistan, Burma and Ceylon. Its existing branches will be transferred to Imperial Chemical Industries (Export), Ltd., who will take over its present organisation in Karachi, Chittagong, Colombo and Rangoon.

COMPANY MEETING

The Distillers Co., Ltd.

Total Investments Representing £50 Million

THE 71st annual general meeting of the company was held in the North British Station Hotel, Edinburgh, on Friday, September 24, when the chairman, Mr. J. Henry Ross, presided.

The chairman said: When I had the privilege of addressing you last year it was in my capacity as deputy chairman, our then chairman, Lord Forteviot, being seriously ill, and, although we all fervently hoped for his recovery, it was not to be, and he passed away on October 24, 1947. His death was a most serious blow to the company, over which he had presided with such dignity and distinction for the previous ten rears, and his loss is keenly felt as a peculiarly personal one by every member of the staff from the highest to the lowest.

As is mentioned in the report, my colleagues on the board have done me the honour of appointing me to the vacant chair. While naturally proud of being called to this high office, I am very conscious of the heavy responsibility accompanying such an appointment, and all that it means to follow in the wake of such a long line of distinguished predecessors. It will be my aim, however, to continue to serve the company and the stockholders to the limit of my ability.

Long Service

You will also observe from the report that, since we met last, we have lost the services of another director in the person of Mr. John Nicolson. Mr. Nicolson retired on pension on March 31 of this year, after having given loyal and devoted service over the long period of 38 years. Those of us who were in close, almost daily, contact with Mr. Nicolson appreciated his wise counsel and guidance, particularly in all matters practical, and, while we shall miss him, it is good to know that he has left behind him a trained staff who have been reared in the best D.C.L. tradition.

The appointment by the board of Mr. William Reid as a member of the management committee took place on November 13, 1947. Mr. Reid has spent his entire business life in the trade, and is at present chairman of John Haig & Co., Ltd., as well as chairman of the group Home Sales Committee. The Management Committee will benefit greatly by his wide and varied experience.

Turning now to the statement of accounts,

you will have noticed that these have been prepared in compliance with the requirements of the Companies Act, 1948. The adjusted figures of March 31, 1947, have been entered in the balance sheet and in the consolidated balance sheet for comparative purposes. In the profit and loss account, however, the previous accounting period was for 10½ months with varying accounting periods for the subsidiaries, consequently the figures are not comparable, and, for that reason, have not been inserted.

Profits and Taxes

The manufacturing and trading profits of the company and its subsidiaries, including an item of £406,677 for inter-company profits in the stock valuations of subsidiary companies released during the year, amounted to £11,119,057; to this is added (1) income from investments and interest £905,007, and (2) provision for taxation made in previous years not required and released £597,601, making the total revenue £12,621,665. Income tax and profits tax required the large sum of £6,021,149, and after the necessary provisions, writings off and transfers to general and superannua-tion reserves made by subsidiary companies as detailed in the report, there was a balance of £4,644,135. The proportion applicable to outside shareholders in subsidiary companies was £339,099, and the undistributed profits of subsidiary companies applicable to the Distillers Company, Ltd., was £684,203 (as against £190,728 retained in this way in the previous accounting At this stage, with the amount brought in, there was available £4,388,986, and the board agreed to apply £1 million to general revenue reserve, and to write off premiums and expenses on purchase debenture stock for cancellation, £156,676, leaving sufficient for the dividends distributed or recommended, and to increase the carry forward from £768,153 to £887,051.

The dividend on the ordinary stock for the year is 1/14d, per unit of 4s, which compares with 1s, per unit for the previous 10½ month period. This is in effect a small reduction, but the board has had to have regard to the heavy expansion programme they have authorised. In common with other large companies, your company is feeling the growing drain of heavy taxation, and the increased costs of replacing stocks and other assets. In addition, in the ex-

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pansion programme, we face the higher prices for capital assets and the expensive delays in obtaining deliveries of necessary material and equipment. There is no doubt that the ultimate total cost of this programme will prove greater than the estimates, although careful consideration has been given, and is being given, to modifications, where possible, to offset these increased prices.

Reserves and Assets

The company's legal balance sheet calls for comment on the following matters:-

(1) The general capital reserve has increased to £1,132,116 by the transfers thereto of the profit on realisation of certain investments during the year and of recoveries in respect of war damage to properties previously written off.

(2) The revenue reserves total £12,932,545, and it will be noticed that the opportunity has been taken to close certain free reserves by transferring the amounts at credit to general reserve.

(3) During the year, the company purchased for cancellation all but £19,400 of the debenture stocks. As I mentioned before, the premium and the expenses of purchase have been written off out of revenue.

(4) Under the heading of fixed assets, lands and buildings and plant, etc., are included at what might be called nominal amounts. For this reason, the directors are satisfied that neither further writings off nor depreciation are required at this time. It has not been found possible to ascertain the original total cost of these assets or of the total writings off and depreciation applied thereto over the past years, and consequently they are inserted at cost, or at cost less sales and amounts written off.

(5) Investments in subsidiary companies now total £23,957,531, a substantial increase of £3,848,641 since the previous date of balance. The main items contributing to this increase are:—

(a) The formation of a new subsidiary called The Distillers Company (Biochemicals), Lid., to take over the factory at Speke, Liverpool, engaged in the production of penicillin, formerly erected and managed by the parent company as agents for the Ministry of Supply:

(b) The purchase of the business of J. & W. Hardie, proprietors of the well-known "Antiquary" brand of whisky. This business was converted into a limited company, and is being carried on as a subsidiary company;

(c) The securing of a controlling interest

in The Peerless Refining Company (Liverpool), Ltd., manufacturers of margarine, cooking fats, etc., part of which are sold to The United Yeast Co., Ltd., for its bakers' sundries trade:

(d) The acquisition of the total issued ordinary shares of The Manchester Chemical Co., Ltd., manufacturers of essences, baking powders and other requisites for bakers: and (e) The purchase of the issued share capital in Alexander Bonthrone & Sons, Ltd., maltsters, Freuchie, Fifeshire.

Your directors are hopeful that these investments will prove of real value within the organisation, and will give reasonable yields on the amounts expended.

(6) These new investments, and the increase in current and loan accounts of subsidiary companies have caused a reduction in the company's holdings of British Government securities. At the date of balance, current assets totalled £21,177,738, as compared with £26,365,894 at the previous balancing date.

The consolidated balance sheet shows that capital reserves, revenue reserves profits unappropriated total £32,753,590. Adding this amount to the issued capital of The Distillers Co., Ltd., we arrive at approximately £50 million as the amount invested in the business as represented by the values at which the assets are stated in the books. It must be borne in mind, however, that, as I have already mentioned, certain of the fixed assets have been written down to practically nominal amounts, while market value of trade investments is, in the aggregate, greatly in excess of book value. Current assets exceed current liabilities by £47 million, but I must point out that the increase in stocks is partly due to replacements at higher prices. It will be noticed that at March 31, 1948, the outstanding commitments for capital expenditure amounted to approximately £1,305,000, but this does not, of course, cover the completion of the expansion programme authorised by the board.

Distilling

When I addressed you last year, the hope was expressed that further distilling licences would be issued to avoid closing down our distilleries, and I am glad to say the industry received authority in December 1947, to purchase an additional 75,000 tons of cereals, which enabled continuity of production to be maintained. Since that time, further negotiations have taken place with the Ministry of Food, and, while full and free production of potable whisky is not yet possible, the Minister of Food, realising the importance of Scotch whisky, not only in the present but in the future economy of

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this country, authorised the granting of 150,000 tons of cereals to the industry for the period to April 30, 1949. Licences for that quantity have been issued, and it will be appreciated that this is an important step towards the replenishment of the general stock position. These licences have again been subject to certain conditions regarding the further stepping up of exports to hard currency areas, by reducing the quantity available for the home market, and to which I will refer later in my remarks.

In order to ensure the earliest possible production at our grain distilleries, it was decided to reopen our Caledonian distillery, which has been silent since 1941. The plant, however, has been maintained in working order, and you will be interested to know that production will commence there within the next 10-14 days.

The operating malt distilleries completed their 1947-1948 licences before closing down in the early summer, and I am glad to say a good start has been made with the 1948-1949 season.

Home and Export Trade

Last year, an arrangement was come to with the Ministry of Food in terms of which the proportion laid down for distribution from May 1, 1947, was 3 gallons for export to 1 gallon released for the home market. This arrangement continued in force until April 30, 1948, as from which date a new arrangement with the Ministry became operative.

As a quid pro quo for the allocation of further cereals, the Ministry insisted on a still greater increase in exports to hard currency markets, and, in view of the stock position, this could be effected only by our making a further reduction in the supplies available for the home market.

The board view with great regret the present meagre allocation being made to the home consumer, and, as soon as the stock position permits, it will be their desire to bring about some alleviation in this direction. We have always taken the view that a healthy trade at home is a necessary adjunct to our export business, and this factor will not be lost sight of.

During the period under review, the rate of duty has been raised on two occasions. In the supplementary budget, introduced in November, 1947, an increase of 33s. 4d. per proof gallon was made, and again in the Budget of April, 1948, a further increase of 20s. per proof gallon. The rate of duty now amounts to the enormous figure of 410 10s. 10d. per proof gallon, and the retail price of a bottle of Scotch whisky is 33s. 4d., of which 24s. 7d. goes to the Exchequer. Representations were made to

the Chancellor on both occasions, pointing out the penal nature of this taxation, but, so far, without avail.

The board will continue to use every endeavour to bring about some reduction in this fantastic rate of duty.

To all intents and purposes the export trade is under Government direction, and the industry was allotted a target figure to cover shipments to dollar markets, such as Canada, United States of America, South America, etc. In satisfying the needs of the Government for the year ended April 30, 1948, it is gratifying to record that our group companies played a very important part, although, to accomplish such a result, and in accordance with instructions from the Ministry of Food, it meant a drastic cut of supplies to "soft" currency countries as well as to the home trade.

Notwithstanding the difficulties with which our group firms have had to contend, our well-known brands of Scotch whisky continue to occupy a prominent place overseas, and are in constant demand.

Gin

Our gin companies likewise, continue to enjoy an increasing demand for their various brands of gin—Gordon's, Booth's and Burnett's—both at home and abroad. This happy position reflects the very high standard of quality which is consistently maintained by our gin group companies in their brands. By arrangement with the Ministry of Food, particular attention is also being paid to "hard currency" markets.

Yeast

The yeast factories have been working practically to full capacity throughout the year under review to meet the demands for their products in home and overseas markets. I regret that permission has not yet been granted by the authorities to proceed with the new yeast factory in the South of England. In the meanwhile, plans and specifications have been prepared, and the company is keeping in close touch with the appropriate authorities. It is hoped that, within a reasonable period, a start on the erection will be allowed.

Although costs of production of the various products have risen quite substantially over the period, no increases in prices to the consumer have been applied.

Industrial Section

It can be well understood that even greater interest is now being taken by the members and others in the industrial side of the company's business, and particularly so in the large and important extension programme in chemicals and plastics authorised by the board. It is satisfactory to record that, in general, good progress has been made in all the various sections, and outputs and profits have been well maintained throughout the year. Certain key materials, of which we are large consumers, have remained critically short, but the supply position as a whole has improved. This, we hope, will eventually lead to some degree of relaxation of Government control, and the introduction of normal trading conditions.

Our programme of extensions, to which I have already referred, has been hampered and delayed by shortages of both constructional materials and labour, and there are, as yet, no signs of any improvement in this respect. While this is a great disappointment, it must be emphasised that the directors are satisfied their plans for expansion are based on what they regard as the long form requirements of a stable market.

Subsidiary Expansion

The new plant for our subsidiary, British Geon. Ltd., at Barry, South Wales, which was reported last year as under construction, commenced operations some months ago. The sales of the product "Geon" brand of polyvinyl chloride, are developing well both at home and in certain overseas markets. Adjacent to this factory, we are creeting another for our subsidiary, British Resin Products, Ltd., to take over the expand their existing manufacturing activities now carried on in three smaller units elsewhere.

As I have mentioned, in the year under review negotiations were completed for the purchase from the Government of the penicillin factory at Speke, Liverpool, and this transaction was followed by the formation of The Distillers Co. (Biochemicals), Ltd., with an issued capital of £1 million. Gratifying progress has been made, and the company is now marketing a high grade of crystalline penicillin. Close attention is also being paid to the production of streptomycin, and the development of similar anti-biotic materials.

In the industrial alcohol market, adequate supplies of molasses were available throughout the year, although the price was still very high. On the whole, so far as can be gauged at present, the outlook for this section is more favourable now than it has been for some time.

The directors have given careful consideration to extending the field of research and development, and a very substantial sum, larger than in any previous year, was apprepriated for this purpose. Some of the

work is of long term nature, but particular attention is being paid to consumer research, from which the company has derived real benefits in larger outputs and better quality of various materials.

Last year, reference was made to the provisional agreement between the company and the Anglo-Iranian Oil Co., Ltd., to erect a plant at Grangemouth for the production of chemicals from petroleum, and I am glad to inform you that the project has been approved by the authorities. A small company was formed, under the title of British Petroleum Chemicals, Ltd., with a nominal capital of £100. The initial work is now well in hand, and application has been made to the capital issues committee for permission to increase the capital of the company to £5 million, which will be subscribed equally by the two companies. It is not necessary to emphasise the fundamental importance, to the Distillers Organisation, of this association with the Anglo-Iranian Oil Company. The advent of more competitive conditions in the chemical industry should not weaken the position, because the scheme has been designed to fit in with, and to become an integral part of, the existing manufacturing interests of the industrial side of our organisation.

Future Prospects

I am sure you will agree that it is neither possible nor desirable, under present conditions, to forecast very far ahead, but I am able to inform you that, so far as the current year has gone, the margin of profit has been well maintained up to the standard of the year to March 31, 1948. There is the added satisfaction that the conservative policy regularly adopted by the board over the past years, with the ploughing back of substantial amounts out of profits, has placed our company in a strong financial position, with good reserves.

It is anticipated that, in future, dividends on the ordinary stock will be paid twice a year, with the interim in February, and the final in October.

And now, ladies and gentlemen, I cannot close-without a word of praise for our staff—a very widely scattered staff, located, not only in Scotland and England, but in Wales and Ireland, and overseas in Canada, Australia, India, South Africa, and in the U.S.A. To each and all, the thanks of the directors are due, and I am sure the stockholders would wish to be associated with this tribute, for, without the devoted efforts of the staff, the satisfactory results now before you would not have been possible.

The report was adopted.

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Company News

The Distillers Co., Ltd., has declared a dividend on the preference stock for the six months ending September 30, at the rate of 3 per cent less income tax, payable on November 15. (Company report page 467).

At the close of the 14th annual general meeting of Folisain Metals, Ltd., an extraordinary general meeting was held at which resolutions were passed approving a rearrangement of the capital structure and the change in the name of the company to Folisain-Wycliffe Foundries, Ltd.

The directors of Imperial Chemical Industries, Ltd., announce that they have declared an interim dividend of 3 per cent (actual) in respect of the year ending December 31 on the £50,455,116 ordinary stock already issued on July 20, 1948. The dividend will be payable on December 1.

The annual general meeting of **Powell Duffryn, Ltd.**, will be held on October 27. The directors recommend payment of the following dividend: Ordinary stock, final dividend of 5 per cent actual, less tax, on the £9,660,471 in respect of the year ended March 31, 1948 (making 8 per cent for the year).

New Companies Registered

Emmet Laboratories, Ltd. (459,016).— Private company. Registered September 22. Capital £100. Manufacturers and wholesale and retail dealers in chemicals, drugs, gases, disinfectants, dyes, acids, etc. Directors: Bernard J. Wilkins and Mrs. Dorothy I. Wilkins. Reg. office: 140 Park Lane, W.1.

Soldruff, Ltd. (26,554).—Private company. Registered in Edinburgh September 21. Capital £100. Consulting, analytical, manufacturing and general chemists, etc. Directors: William B. Paton and Mrs. Isabella F. Paton. Reg. office: 54 Kempoch Street, Gourock.

Shadforth, Ltd. (459,001).—Private company. Registered September 21. Capital £100. Manufacturing chemists and dealers in chemicals, gases, drugs, etc. Directors: Wm. Shadforth, Emily H. Shadforth, Marcus W. Shadforth and John Jones. Reg. office: Mitre Works, Cordova Road, Bow. E. 3.

Staveley Iron & Chemical Co., Ltd. (459,090). — Private company. Registered September 23. Capital £100. To acquire those parts of the undertaking of the Staveley Coal & Iron Co., Ltd., which have consisted of the carrying on of the business of iron

ore and iron production, ironfounding, the generation of electricity, the manufacture of chemicals, and the ownership and management of housing estates, etc. Solicitors: Linklaters & Paines, 6 Austin Friars, E.C.2. Reg. office: Staveley, Derbyshire.

Chemical and Allied Stocks and Shares

TOCK markets have continued to maintain a steady undertone despite the serious international developments. In fact there was no heavy selling, and although in some instances in the absence of buyers, prices were marked back, declines on balance were mostly small. Recent strength of British Funds, however, was followed by profit-taking in 24 per cent Consols and Treasury Bonds, while 3 per cent Transport came back to 99.

Chemical and kindred shares were generally steady. Imperial Chemical strengthened to 44s, 9d, with the new shares (20s.) paid at 23s. 71d. Laporte Chemicals 5s. units were again 20s. 6d., Amber Chemicals 2s. shares were 9s. 6d., and Albright & Wilson 5s, shares 28s, 6d. Fisons changed hands up to 59s, 3d., and helped by the review of the widespread activities of the group given at the annual meeting, the 4s. units of the Distillers Co. were steady at 27s. 6d. Burt Boulton & Haywood have changed hands at 25s., and W. J. Bush marked 80s. Moreover, Moasanto Chemicals 5s, ordinary have held steady at 57s, 6d, at the time of writing. Turner & Newall eased to 75s. 6d., United Molasses to 47s. 11d., and British Oxygen 98s. 11d.

Now the Coal Board wishes to acquire coke-ovens, shares of companies with these assets have been a lively market, although in all cases best levels were not held. British Benzol, for instance, were up to 85s. before easing to 81s. 104d. Monekton Holdings were 49s., Thorncliffe Coal 15s., and Benzol and By-Products strengthened to 7s. 9d. Current market estimates are that these prices are well below break-up values of the shares; but too much reliance should not be placed on these assumptions until details of the offers made by the Coal Board are known. Coalite & Chemical 2s, shares have remained unchanged at 4s. 11d. because in this case there is no question of "take-over" as the company was assured by Mr. Shinwell when he was Minister of Fuel that it would not be nationalised.

Staveley Coal were again a good feature, strengthening further to 85s, earlier in the week prior to the statements at the annual meeting. Iron and steels, still under the cloud of expected nationalisation, moved narrowly, and were unresponsive to the great activity in the industry and the implications of rearmament. Colvilles rose to 34s. 9d., however, Dorman Long were 31s. 6d., Guest Keen 48s. 5½d., and United Steel 28s. 4½d. In other directions, Associated Cement changed hands around 71s. 6d., British Plaster Board eased to 24s. 3d., and British Match to 36s. Goodlass Wall were steady at 35s. 6d., as were British Aluminium at 47s. 6d., but Amalganated Metal eased to 19s. 4½d., and Borax Consolidated came back to 60s. 6d.

British Drug 5s. shares kept firm at 9s. 6d., and Boots Drug were 52s., with Sangers 30s. 14d., Beechams deferred 18s., and Glaxo Laboratories at £184. Blythe Colour 4s. shares were 58s. 9d., Greeff-Chemicals Holdings 5s. shares 14s., and A. Boake Roberts 31s. 3d. Oil shares encountered selling, Ultramar falling afresh to 45s., with Shell at 72s. 6d., Anglo-Iranian 72, and Lobitos 70s. There was no heavy selling, but oil shares are generally very sensitive to any difficult turn in international news. Although it is realised that an increase in the total payment is extremely unlikely in view of dividend limitation, the market is hoping that Anglo-Iranian may decide to bring its interim payment more into line with the final dividend.

British Chemical Prices Market Reports

THE demand for industrial chemicals continues to be fully maintained as far as home trade is concerned, and the volume of inquiry for export remains on a good scale. The week has not witnessed any important price changes and quotations in most sections of the market are on a firm basis. Reports indicate a slight improvement in the overall supply position but a scarcity of spot offers remains evident among the soda alkalis and for a number of chemicals used in the textile and paint industries. The potash pro. ducts are also firm on a limited supply position. Acetic acid, acetone and formaldehyde are items for which there is an active demand and there is a fair inquiry for arsenic and hydrogen peroxide. Conditions in the coal tar products market remain fairly active with the home demand absorbing quantities on offer.

MANCHESTER.—New inquiry on the Manchester chemical market during the past week has been fairly plentiful, embracing a wide range of both light and heavy products, and actual replacement buying from the textile and allied trades and other indus-

trial users has amounted to a substantial quantity in the aggregate, with the pressure for contract deliveries fully maintained at around its recent level, especially for the alkali products. Additional inquiries from shippers have been fairly numerous. In the fertiliser trade a fair weight of business for the time of the year is being arranged in superphosphates and other materials, and a brisk demand for most of the light and heavy tar products is reported.

GLASGOW.—In the Scottish chemical market there has been little change during the past week, business having been fairly satisfactory and up to normal for this time of the year. There has been no particularly outstanding demand and coal-tar products have, as usual, been well absorbed. Prices have been stable, and there has been no change worthy of note. In the export market conditions have been a little quieter, but inquiries are still numerous and the number of orders reasonably satisfactory.

LEATHER TRADES CHEMISTS

A T the annual general meeting and conference of the Society of Leather Trades Chemists, held at Leeds University on September 17 and 18, a welcome was extended to visitors and associates from Australia, Belgium, France and the United States. Mr. Derek Bryant, of Australia, handed to the chairman a silver mounted gavel, which, he said, he had brought as a present to the British Society from his country's section, as a mark of esteem and goodwill.

Papers were read, including the following: "Recent Studies of the Chemistry of the Liming Process," by Dr. Joane Bowes; "A New Method of Determining the Acidity in Tan Liquors and its Application to Vegetable Tanning," by Dr. D. Burton; "Recent Studies in Chrome Tanning," by Prof. E. R. Theis (Lehigh University, U.S.A.); "Recent Work on Osmotic Pressures, Membrane Equilibria and Solubility Factors of Proteins in the Light of the Work of Proter," by Mr. G. S. Adair; "Scientific Experience," by Dr. R. H. Marriott; and "Solubility and Other Studies on Quebracho Tanning Extracts," by Dr. T. White.

It was announced by Prof. P. Chambard, as president of the International Union of Leather Chemists' Societies, that the first international congress of the union would take place in Paris in September, 1949

take place in Paris in September, 1949.

The "Donald Burton" prize for 1948 was presented to Dr. D. A. Plant for his work on "Some Aspects of Complex Formation in Basic Chromium Sulphate Solutions."

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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process for the catalytic hydro-forming of naphthas.-C. Arnold. (Standard Oil Development Co.) April 26, 1945. 606,664.

Preparation of ditertiary diamine derived from analiae.—Soc. des Usines Chimiques Rhone-Poulenc. Oct. 18, 1943. 606,665.

Production of synthetic elastomers.-Shell Development Co. June 20, 1944. 606,807. Production of heterogeneous mixtures of particles adapted for use in heavy-media separation processes .- V. Rakowsky. July

12, 1944. 606,671. hexanetriol.—Soc. Production of des Usines Chimiques Rhone-Poulenc. July 7,

1943. 606,564.

Preparation of cyanamide.—American Cyanamid Co., and A. H. Stevens. July 25, 1945. 606,568.

Recovery of guanidine salts .- A. (American Cyanamid Co.) Aug. Stevens.

1945. 606,901.

Preparation of cyclohexane and alkylated aromatic hydrocarbons.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, J. Habeshaw, and R. A. Lowry. Aug. 9, 1945. 606,811.

Method for obtaining industrally pure dcuble sodium zirconium sulphates.—Soc. des Produits Chimiques des Terres Rares. May 11, 1944. 606,681.

Manufacture of ester-like derivatives of azo-dyestuffs.-Ciba, Ltd. Oct. 6, 1944. 606,814.

Production of polymerisable materials.— 1.C.I., Ltd., R. Hammond, and J. W. C. Crawford. Oct. 15, 1945. 606,685.

Process for the production of 2- (aminoalkyl) pyrimidines and derivatives thereof. —Ward, Blenkinsop & Co., Ltd., Howards & Sons, Ltd., A. A. Goldberg, and W. Kelly. Nov. 21, 1945. 606,714.

Process for the production of resin-coated articles.-Shell Development Co. Jan. 8,

1945. 606,697

Polymerisable naterials and polymers thereof.-I.C.I. Ltd., and R. Hammond. Jan. 2, 1946. 606,716.

Polymerisable materials and polymers thereof.—I.C.I., Ltd., R. Hammond, and D. N. Speyer. Jan. 2, 1946. 606,717.

Manufacture of iron castings .- British Cast Iron Research Association, H. Morrogh, and J. Bernstein. Jan. 16, 1946.

Manufacture of aliphatic acid anhydrides, G. E. Smith, and W. Hunter. Jan. 16, 1946. 606,607.

Manufacture of alcohols by hydration of olefins.—W. Hunter. Jan. 16, 1946, 606,608.

Production of cellulose derivatives .-Celanese, Ltd. Jan. 16, 1945. 606,610.

Manufacture of azo-dyestuffs.—Ciba, Ltd.

Jan. 25, 1945. 606,731.
Heat treatment of steel.—I.C.I., Ltd., and T. A. Goskar. Jan. 17, 1946. 606,734.

Process for the manufacture of peroxide compounds by oxidation of amalgams .-N.V. Koninklijke Netherlandsche Zoutindustrie. April 21, 1944. 606,745.

Process for the synthesis of hydrocarbons. (Standard Oil Development Co.) Jan. 21, 1946. 606,863.

Method of manufacturing thorium.— Westinghouse Electric International Co. Jan. 23, 1945. 606,930.

Moulding polyvinyl chloride pastes .-B.X. Plastics, Ltd., and J. A. Hetherington. Jan. 22, 1946. 606,936.

Extraction of penicillin .- Merck & Co.,

Inc. Feb. 10, 1945. 606,940.

Process for the stabilisation of organic substances of high molecular weight containing combined halogen.-N.V. de Bataafsche Petroleum Maatschappij. July 12 606,702.

Manufacture of highly polished polyvinyl chloride sheets and coated fabrics.-I.C.I., Ltd., and W. L. Brogan. Feb. 11, 1946. 606,705.

Manufacture of substantive azo-dyestuffs. --Ciba, Ltd. Feb. 20, 1945. 606,872.

Process for purifying fuel gas.-Koppers

Co., Inc. July 1, 1944. 606,624. Multi-stage centrifugal pump.—Harland Engineering Co., Ltd., and H. H. Anderson. Feb. 20, 1946. 606,947.

Magnesium and magnesium base alloy castings,-Aluminum Co. of America. March

7, 1945. 606,948.

Treatment of fatty acids, and of glyceride oils.-Lever Bros. & Unilever, Ltd. July 7, 1942. 606,711.

Process for the isolation of pentaerythrite from its solutions.-Soc. Des Usines Chimiques Rhone-Poulenc. March 22, 606,954.

Process of extracting penicillin and product of said process.—Wyeth, Inc. Feb. 8, 1944. 607,122.

Process of obtaining aliphatic sulphonic acids .- Soc. d'Innovations Chimiques. Sept. 28, 1943. 607,204.

Processes for producing substituted acridines.—E. Lilley & Co. April 27, 1944.

Preparation of substituted cyanoacetic esters.-Sharp & Dohme, Inc. 1944. 606,962.

Catalytic hydroforming of naphthas .-J. C. Arnold. (Standard Oil Development Co.) June 12, 1945. 606,964.

Preparation of esters of alpha-formylphenaceturic acid and compounds formed therefrom.—Lederle Laboratories, June 13, 1944. 606,965.

Process for producing steel with a low nitrogen content in the converter .- Soc. Anon. J. Cockerill. March 13, 1943. 607,209.

Manufacture of carbon black.-Phillips Petroleum Co. Dec. 3, 1943. 607,296.

Methods for the oxidation of saturated aliphatic hydrocarbon gases.-Clark Bros. Co., Inc. Aug. 9, 1944, 606,967.

Manufacture of sulphuric acid leuco esters of anthroquinone azo-dyestuffs.-Durand & Huguenin A.G. July 28, 1945. 607,219.

Manufacture and use of phenoxyethylammonium compounds.—Ciba, Ltd. 24, 1944. 607,222.

Manufacture of hydrophenanthrene carboxylic acids and derivatives thereof .-Ciba, Ltd. Nov. 30, 1944. 607,134.

Prism spectro meters .- American Cyanamid Co. March 21, 1945. 606,976.

Production of ammonium sulphate .-I.C.I., Ltd., and K. Gordon. Dec. 12, 1945. 607.231.

Butadiene-styrene copolymer.-Wingfoot Corporation. Oct. 2, 1945. 606,980.

Process for the production of isoprene by distillation of rubber.—Rubber Stichting. April 6, 1943. 607,233.

Process for the preparation of gel particles.-C. Arnold. (Standard Oil Development Co.) Jan. 15, 1946. 607,234.

Manufacture or production of steel or alloy steel strip.-Birlec, Ltd., and P. F. Hancock. Jan. 23, 1946. 606,996.

Penicillin manufacture .- I.C.I., Ltd., and T. Leigh. Jan. 23, 1946. 607,004.

Preparation of riboflavin,-Glaxo Labora. tories, Ltd., and W. B. Emery. Jan. 23, 1946. 607,008.

Production of chemical compositions containing lead dioxide.-Dunlop Rubber Co., Ltd., and M. Goldstaub. Jan. 24, 1946. 607.044

Production of fatty acids and fatty alcohols.—Bamag, Ltd., M. K. Schwitzer, and W. Williams. Jan. 24, 1946. 607,064.

Cellulose ester or ether fibres.—H. C. Olpin, W. B. Miller, and S. A. Gibson, Jan. 25, 1946. 607,085.

Production of organic fluorine compounds. E. I. du Pont de Nemours & Co., and G. W. Rigby. Jan. 25, 1946. 607,103.

Phenol formaldehyde condensation resin. —I.C.I., Ltd., and T. J. B. Arthur. 25, 1946. 607,104.

Accelerators for the vulcanisation of natural and synthetic rubber.—Monsanto Chemical Co., and M. W. Harman Dec. 6, 1944. 607,111.

Antibiotic substances and processes of preparing same.-Merck & Co., Inc. Feb. 9, 1945. 607,186.

Methyl siloxanes and methods of preparing them.-Corning Glass Works. Feb. 14, 1945. 607,253.

Process for catalytically dehydrogenating hydrocarbons.—Universal Oil Products Co. Feb. 11, 1942. 607,256.

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None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

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CHEMICAL MANUFACTURING COMPANY requires Senior Engineer to take charge of the design and construction of a new factory, to cost over a million pounds, on the east coast of England. Candidates should be highly qualified in theoretical and practical design of unit chemical processes and have good experience of chemical works layout, services and mechanical handling. Man with good personality and initiative is required to build up his own team, whilst able to co-operate fully with the existing research and other staffs of the commany. Candidates 35 coach and other staffs of the company. Candidates, 35 years or over, should write, giving full details of training, experience and salary required, to Box No. 2705, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

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APPLICATIONS are invited for the position of Station Chemist at the Kingston "B" Power Station. Applicants must hold a B.Sc. degree in chemistry

Applicants must noid a B.Sc. degree in chemistry, have had experience of analysis and testing of coal, oil and water, and control of laboratory staff. Experience in problems of boiler fouling and water corrosion, associated with high pressure and high temperature steam generating plant would be an advantage.

Salary in accordance with Class H, Grade 7 (1) of the National Joint Board Agreement. £600 per annum, including four control of the Salary in accordance with Class H, Grade 7 (1) of the National Joint Board Agreement. £600 per annum, including four control of the Salary in accordance with Class Company.

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Construction work is in progress which will bring this

salary into Class J of the National Joint Board Agreement in the near future.

Applicants for the above position should not be more than 45 years of age.

Forms of application may be obtained by sending a stamped addressed foolscap envelope to the DIVISIONAL SECRETARY, British Electricity Authority, South Eastern Division, British Electricity House, Lower Ham Road.

Kingston-upon-Thames, Surrey. Completed application forms, clearly endorsed, must, be returned to the above address not later than 22nd October, 1948.

CROWN AGENTS FOR THE COLONIES

APPLICATIONS from qualified candidates are invited for the following post:—

CHEMIST required by the East African Industrial Management Board, Nairobi, Kenya, for one tour of 3 years in the first instance. Salary 4450 a year. Free passages. Candidates, not over 35, must hold the degree of B.Sc. (Chemistry) or B.Sc. General (with Chemistry as one subject), or possess equivalent qualifications. general analytical nature connected with edible oil refining and hydrogenation, sulphuric acid, hydrochloric acid, sulphates, alkalis and ceramics. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/21789/3E ou both letter and envelope.

CHEMIST with interest in chemical engineering required on the laboratory staff of a large firm of chemical manufacturers, for pilot-plant development work. The position offers good prospects. Pension scheme in operation. Apply with full particulars of qualifications and salary required to Box No. 2708, The CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

DRAUGHTSMEN of section leader ability, having high standard of drawing skill, and considerable experience of chemical plant or marine engineering FIPEWORK arrangements. Able to carry through large contracts, be thoroughly reliable, accurate and capable of checking own drawings and those of juniors. Reply, giving full particulars and when available, to The Secretary, Chemical Engineering & Wilton's Patent Furnace Co., Ltd., The Old House, London Road, Horsham.

PLANT ENGINEER required for construction and maintenance in a large chemical works in the Home Counties. Candidates should be between 30 and 40 years of age, and should have sound theoretical training and or age, and snound nave sound theoretical training and practical experience in mechanical engineering, including steam raising and power generation; experience of chemical works practice an advantage. Candidates should state age, details of training and experience, and salary required. Good prospects for a first class man. Applications to Box No. 2707, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4. 948

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by 6 h.p. 440/3/50 cycles electric motor, complete with starter. Capacity, 60 gallons.

One—Double-tube ROTARY DRIER by Vickers-Armstrong, 52 ft. long by 7 ft. 6 in. diam (int. tube, approx. 3 ft. 6 in. diam.); outer shell, ½ in. riveted steel plate with internally botted flights; drive by 50 h.p. Brook totally enclosed slip-ring motor, 440/3/50, through David Brown Radicon Reduction gearbox, 50 h.p. Complete with brick furnace, approx. 16 ft. long by 10 ft. by 10 ft., and Babecck & Wilcox chain-grate stoker, 54 in.

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Horizontal 2-stage vacuum rump by Pearn, size 8 in. by 6 in. by 4 in. Displacement approx. 80 cu.ft. per minute; 24 in. by 3 in. fast and loose pulley drive fitted belt striking gear.

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-24 in. diam. Overdriven HYDRO EXTRACTOR by Broadbent. Vulcanite-lined basked and Monitor case. Basket perforations, ½ in. diam.; basket, 19 in. deep. Drive by fast and loose pulleys, 8 in. diam. by 3½ in. face with jockey pulley. Horizontal Twim "Z "'-bladed MIXER by Grasso. Trough, 20 in. by 20 in. by 20 in. deep. Arranged for hand tilting through chain and counterbalance weights. V-rope pulley drive through machine-cut gears. machine-cut gears

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Multi-tubular AIR COOLER, brine type, size 2 ft. 7 in. long by 2 ft. 3 in. by 2 ft. 3 in. Outer casing constructed from $\frac{1}{2}$ in. mild steel plate. Brine inlet and outlet size $1\frac{1}{2}$ in.

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